ENGINEERING NEWS-RECORD

JUNE 27, 1946

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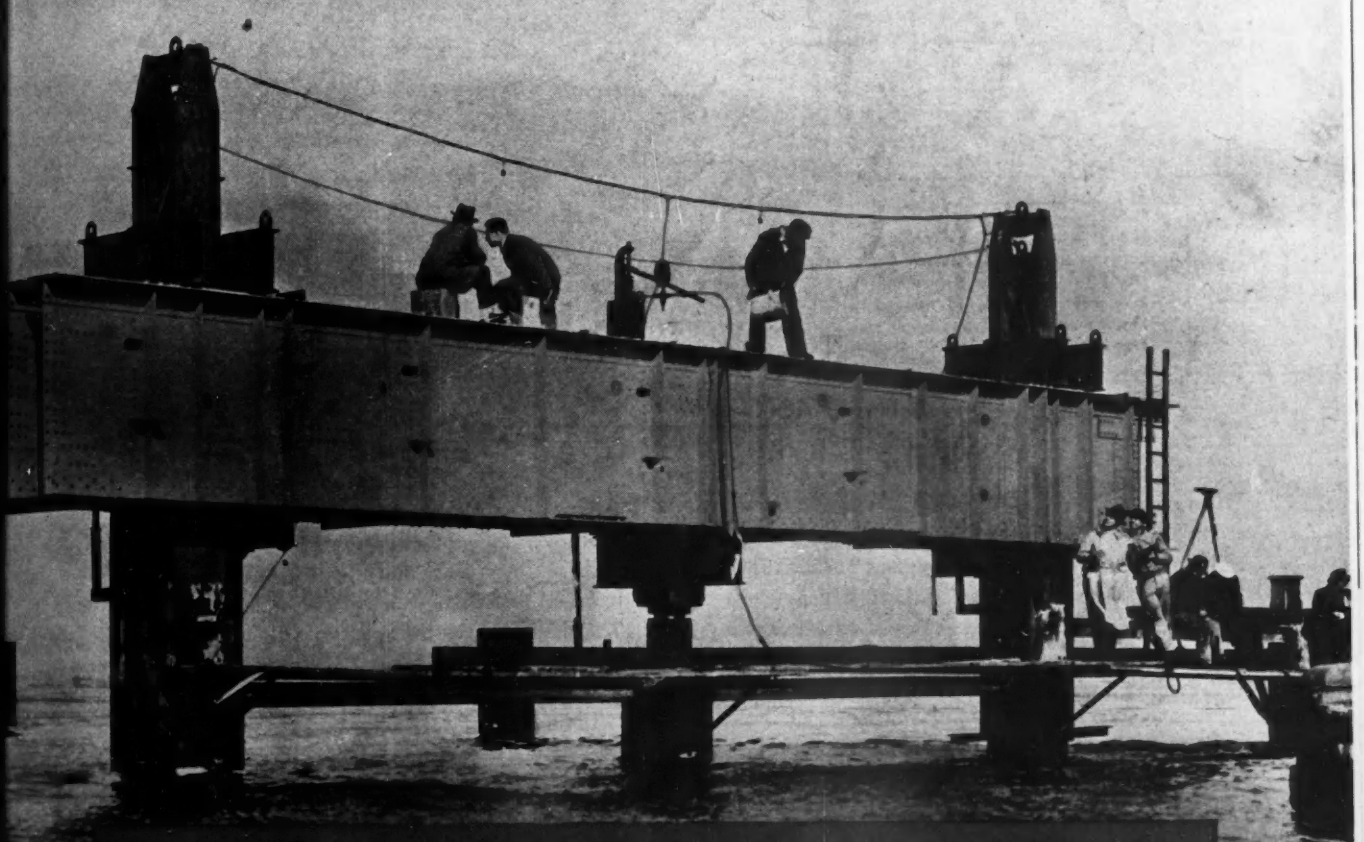


Test assembly used to determine the bearing capacity of cylinders designed to support a heavily loaded pier.

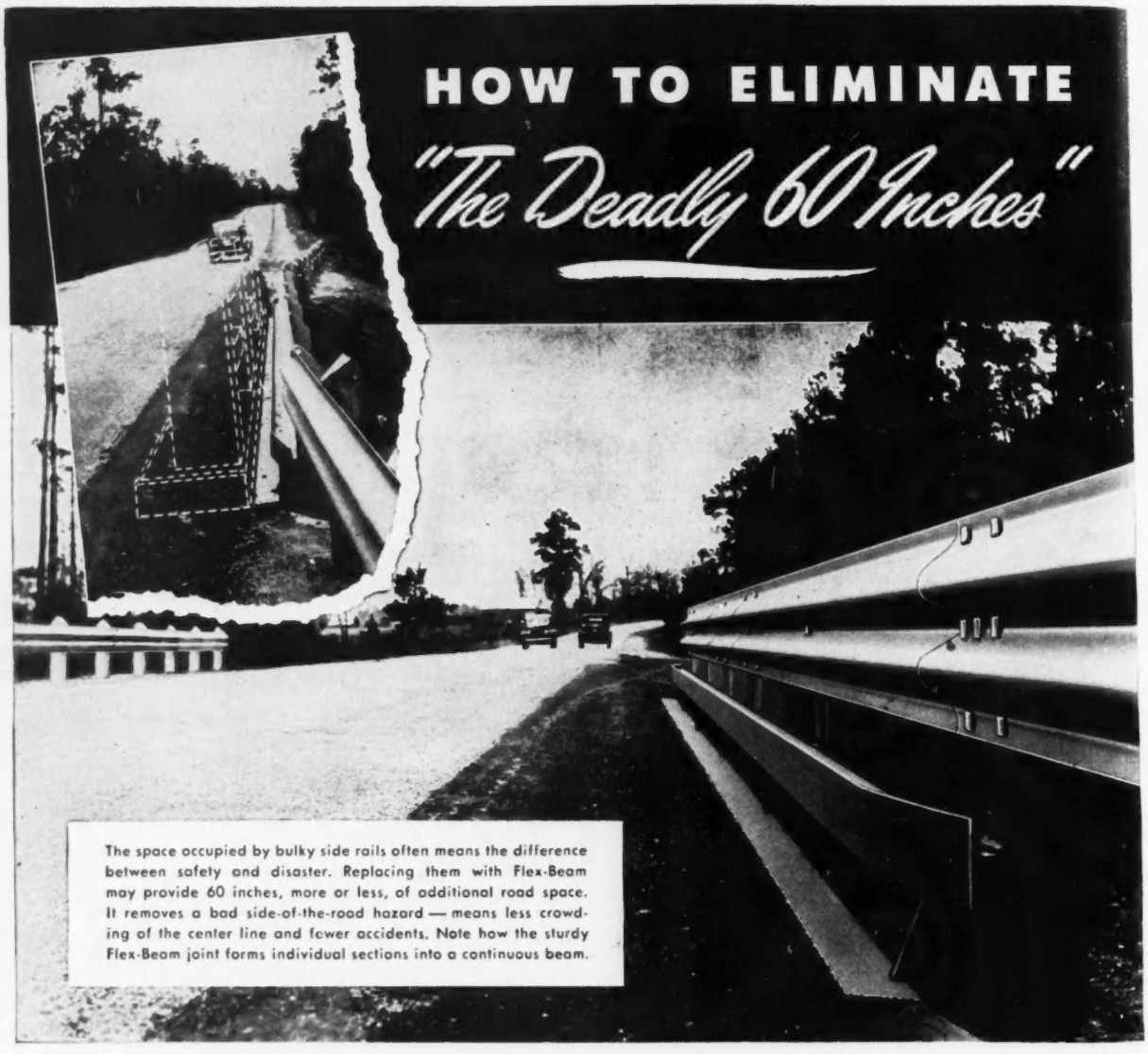
Featured In This Issue

MULTIPLE SUSPENSION SPAN FOR THE RHINE

RELINING A RAILROAD TUNNEL

DESIGN FOR A LINOLEUM CURING BUILDING

HOW TO ELIMINATE "The Deadly 60 Inches"



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Volume 136 • Number 26

June 27, 1946

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FEATURES IN THIS ISSUE

News of the Week		53
Editorials		62
Pier Supports Loaded to Design Capacity		64
Design for Linoleum Curing Building		68
Graphical Calculation of Backwater	F. F. ESCOFFIER	71
Suspension Bridge at Dusseldorf	D. B. STEINMAN	72
Cost of Temporary War Housing		75
Deep Cutoff Trench for Earth Dam	H. KRAMER	76
Water Standards for Potomac		81
A Coral Island Water Supply Problem	J. P. LAWLOR	83
New Collapsible Lighting Standards		85
Box Members Distinguish Concrete Bridge		86
Repair Methods for Tunnel Lining	W.W. MORRISON & E. E. SEELYE	88
Higher Service Charges Meet Rising Costs		91
Designing Highway Bases in Clay Soils	H. C. PORTER	92

DEPARTMENTS

Construction Trends	51	Men and Jobs	116
From Field & Office	94	Manufactuurers Activities	120
Comment and Discussion	95	Elections and Activities	124
Unit Prices	99	Manufacturers Publications	126
New Aids	102	Construction Reports	159

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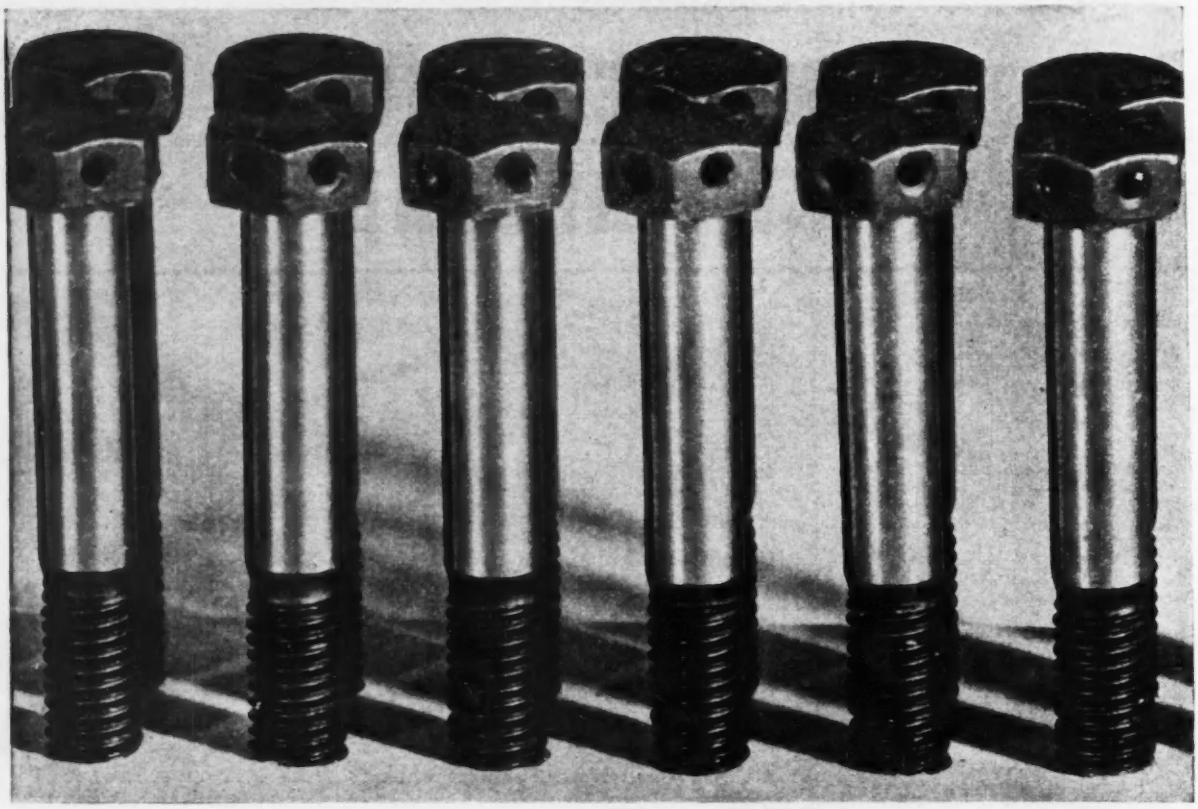

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News of the Week

ENGINEERING NEWS-RECORD • JUNE 27, 1946 • VOLUME 136 • NUMBER 26

Survey shows construction material supplies very low

Twelve-city check by Engineering News-Record shows lumber, plywood and steel worst in tight supply field—Some black market activities reported in lumber and brick

Substantiating some government reports and general opinion, an *Engineering News Record* survey in twelve key U. S. cities last week showed the nation's construction material supplies in stock for local distribution to be alarmingly low.

Only one lighter spot appeared in an othewise dark picture—common and most skilled labor apparently is available in sufficient quantities to carry forward construction in hand, although the reports were almost unanimous in the statement that productivity has decreased. Bricklayers, however, are far below demand.

By far the worst shortage appears in lumber, where all but two areas reported that supplies on hand were more than 50 percent below demand for boards and timber, and most cities reported that plywood of any kind is almost unobtainable. Supplies running far below demand were also reported in brick, tile, reinforcing steel and plate glass.

Some black market reported

Excepting in lumber and brick, the black market in building supplies apparently is small. Every report submitted mentioned rumors and unconfirmed reports of black market operations, but few were able to substantiate large-scale dealings.

Reputable contractors and suppliers apparently have shied away from black market purchases because of the generally poor quality of materials supplied in this way and the very high prices—charged usually on a "pay and take" basis with no "comeback" possible.

In lumber, however, uncontrolled sales by small mills—some of them portable—to dealers who truck off the green "finished" wood and answer no questions as to their sale-prices or office addresses, seem to be prevalent through the midwest and north-central states.

Basis for survey

The survey was made through the facilities of *ENR's* own news correspondent staff and news bureaus in twelve key cities—New York; Chicago; Atlanta; Seattle; Minneapolis; Austin, Texas; St. Louis, Mo.; Jackson, Miss.; Boston, Mass.; Cleveland, Ohio; San Francisco and Rochester, N. Y.

Correspondents were asked to determine, on the basis of percentage of supply below current demand, what situation exists in the markets for common and face brick; hollow partition and bearing tile; plate glass; concrete block; lumber, boards 1½ and 2 in. and heavy timbers; plywood; structural steel and reinforcing bars; cement; and skilled and unskilled labor.

Additionally, they supplied information summing up the situation in their areas.

In tabular form, the results of the survey, tabulated by cities affected, are shown on page 56.

Lumber situation

Complicated by processing necessities, such as need for proper curing, and by lengthy strikes in sawmills and forests, the lack of lumber appears to be the worst construction material supply bottleneck foreseeable.

High lumber prices are being produced by a growing practice, reported in New York, Cleveland, Minneapolis, Seattle and other cities, of shipping in large logs and having them sawed into heavy timbers later. Some of these tim-

(*Continued on page* 56)

Congress acts on appropriations bills

In approving appropriations bill (H. R. 6335) for the Department of Interior for the fiscal year beginning July 1, the Senate increased to $169,117,270 the money allowed for engineering and construction work by the Bureau of Reclamation.

This total compares with $107,345,530 as the bill passed the House (*ENR* May 23, vol. p. 823).

The Senate also provided large increases for engineering and construction operations by other agencies in the Department of Interior. This money includes: Bonneville Power Administration, $19,000,000; Bureau of Indian Affairs, $10,191,050; Geological Survey, $7,888,000; Southwestern Power Administration, $7,500,000; Territory of Alaska $4,290,000, and National Park Service, about $24,730,000.

The money approved for the Bureau of Reclamation is earmarked as follows: general investigations, $11,000,000; construction (reclamation fund), $32,025,138; general construction fund, $86,168,400; Fort Peck Project, $1,000,000; Missouri River Basin, $25,582,202; Colorado River Dam fund, $9,751,530, and water conservation, the sum of $3,340,000.

A flood control bill (H.R. 6597) authorizing $750,000,000 of flood control construction by the Corps of Engineers, $150,000,000 of work in the Missouri River Basin by the Department of Interior, and $25,000,00 for watershed improvements by the Department of Agriculture has been passed by the House. The sum of $10,000,000 additional is authorized to be expended in equal amounts by the War and Agriculture departments for examinations and survey.

The bill is not an appropriation measure, and therefore contains no money. The largest of the projects approved by the House committee on flood control were listed in *ENR* June 6, vol. p. 887. Almost all of these projects were approved by the House as a whole.

If the Senate follows the example of

(*Continued on page* 56)

NEWS IN BRIEF

In telegraphic form, here are latest news developments on the engineering and construction front during the week.

Highways—*Racine, Wis.*, has announced a 3-year street improvement program amounting to $4,500,000. . . . A future $69,000,000 throughway and city arterial route construction program for the *Buffalo, N. Y.*, area has been submitted by Charles H. Sells, N. Y. state public works superintendent. . . . A 10-year $16,000,000 improvement program is being considered by *Milwaukee County, Wis.* . . . *Macon, Ga.*, will pave 40 of its streets soon at a cost of $500,000. . . . The *Tennessee* Highway Department had under contract on June 1 approximately $9,000,000 in road contracts. . . . A proposed $50,000,000 to $80,000,000 central artery through *Boston, Mass.*, and the $20,000,000 under-harbor tube paralleling the Sumner traffic tunnel between East Boston and the mainland are to be held in readiness by the Massachusetts Post-War Highways Commission until the city goes forward with the construction of off-street parking facilities, legislative leaders announced recently.

Water Supply—*Columbus, Ohio*, is considering a 50-year plan for four new reservoirs to increase the city's water supply from seven billion to 27 billion gallons. . . . Citizens of *Napa, Calif.*, have voted $1,750,000 in bonds for an 18-mile pipeline to Conn Dam for the Conn Valley municipal water project. . . . The Navy has consented to the use of one of its railway electric power generating units by the Salt River Waters Users Assn., *Phoenix, Ariz.*, to provide emergency power for pumping underground water. . . . A $7,250,000 expansion program was announced recently by the water board of *Eugene, Ore.*, for a 10-year period.

Miscellany — Several *Massachusetts* municipalities are considering placing all wiring underground. *Belmont* has already done so in a large section of the town. *Wakefield* started such a plan but was interrupted by the war. . . . Preliminary plans are being prepared for a concrete and brick addition to the Washoe County General Hospital at *Reno, Nev.* . . . Stearns and Koon of Portland, Ore., will study the sewage treatment requirements of *Walla Walla, Wash.* . . . Plans are being made for a fireproof addition to the Firland Hospital at *Richmond Beach, Wash.* . . . The *Peoria, Ill.*, park board has adopted a resolution to give the State of Illinois or the federal government a suitable long term lease upon a portion of its airport for the purpose of locating thereon a hangar and other necessary improvements for accommodating an Air National Guard Squadron. . . . *Rockford, Ill.*, has approved the site for a new city garbage incinerator. Through use of incinerator steam for pumping water, a saving a $7,000 yearly is expected. The 3-story brick incinerator will cost $207,000, including steam generating equipment.

Bond Issues—*Kingsport, Tenn.*, will vote on a bond issue July 11, $750,000 for waterworks improvements and $1,250,000 for new school buildings. . . . Voters of *Hapeville, Ga.*, approved a $302,000 bond issue for municipal improvements including sewers, street improvements and a municipal building June 5. . . . Aug. 14 *Atlanta, Ga.*, will vote on a $20,100,000 issue for sewers, highways, airports and other facilities. . . . *Ocala, Fla.*, has approved $350,000 in bonds for additions to public schools. . . . The *Louisville, Ky.*, board of education seeks a bond issue for new school buildings.

District will treat Maryland sewage

An agreement has been reached between the District of Columbia and the Washington Suburban Sanitary Commission whereby the sewage from Montgomery and Prince Georges Counties, Maryland, will be discharged into the Washington sewerage system for treatment at the district's plant at Blue Plains. Harold A. Kemp, director of sanitary engineering for the district, reports that the agreement, which will require that the commission pay for treating its sewage, will be made effective in the next year and a half to two years. This time will be necessary to prepare the required plans and to provide for financing of the proposed construction work.

From other sources, it is learned that the Maryland sanitary commission will abandon the use of its 7.5 mgd. primary treatment plant when the connecting sewers are built. This plant, costing about $800,000, was first put in operation in November, 1940 (*ENR* May 8, 1941, vol. p. 748). Preliminary data indicated that it will be about $5.00 per million gallons cheaper to handle sewage through the District of Columbia facilities than to enlarge and improve the Maryland plant.

A study of pollution conditions within the Potomac basin by the Interstate Commission on the Potomac Basin revealed that the dry-weather flow in the Anacostia River could no longer handle adequately wastes from the two Maryland counties. The study also showed that the ultimate load from the two counties would equal that of a population of 100,000.

Construction of several miles of trunk sewer will be required by the Maryland commission under the plan. To provide better sewage treatment for the large population in Washington the district plans a $2¼ million construction program to enlarge its Blue Plains plant from 130 mgd. to about 175 mgd. by construction of four new sedimentation basins.

Other agreements expected

Similar situations to that in the Anacostia River have developed at other points in the Washington, D. C. area. negotiations are now under way for the treatment of some of the sewage from Alexandria, Va., at the Arlington County, Va., treatment plant. Alexandria now empties all of its sewage untreated into Four Mile Run and the Potomac River. Plans for enlarging the Arlington County plant are under consideration and will be required to handle the increased population in the county, even if no sewage from Alexandria is treated.

A $4,448,000 sewage treatment plant will be built in the Dorchester section of Boston, Mass., to eliminate the present pollution of waters and bathing beaches in South Boston, Dorchester and Quincy, according to Public Works Commissioner Robert P. Curley.

Calendar of Meetings

NATIONAL

American Congress on Surveying and Mapping, annual meeting, Hotel Statler, Washington, D. C., June 28-29.

American Society for Testing Materials, 49th annual meeting, Hotel Statler, Buffalo, N. Y., June 24-28.

Society for Experimental Stress Analysis, spring meeting, Hotel Statler, Buffalo, N. Y., June 24-26.

Chinese Institute of Engineers, America Section, annual convention, Hotel New Yorker, New York, N. Y., June 29-July 1.

Associated General Contractors of America, Washington, D. C., spring governing and advisory board meeting, Sherley-Savoy Hotel, Denver, Colo., June 29-July 2.

American Society of Civil Engineers, 1946 summer convention, Davenport Hotel, Spokane, Wash., July 17-20.

REGIONAL

Ninth Annual Short Course for water and sewage personnel, Louisiana State University, Baton Rouge, La., July 25-27.

American Shore and Beach Preservation Association, summer meeting, The Breakers, Cedar Point, Ohio, Aug. 15-17.

Housing chiefs predict 1,200,000-unit goal will be reached in current year

CPA administrator sees veterans' program needs met despite shortages—Approve new high priorities for materials

Federal officials last week confidently predicted that the 1,200,000-unit goal set for the Veterans Emergency Housing Program during 1946 would be reached, and announced numerous other developments on the housing front.

Speaking before the National Conference of Business Paper Editors, John D. Small, administrator of the Civilian Production Administration, said that the 1,200,000-unit goal will be met within 1946, and cited the fact that the National Housing Agency had already approved applications for construction of 600,000 units—a much greater total than was expected at this time, Mr. Small said.

He added that the recent CPA order reducing by two-thirds the dollar volume of non-housing construction approved by CPA regional representatives (*ENR* June 6, vol. p. 879) has resulted in a 68 percent reduction in the volume of approved construction other than housing within the first ten days of June. Mr. Small said that he expected the order must remain in force for several weeks to permit already authorized housing jobs to proceed at the desired rate.

Shortage to continue

Commenting on the continuing critical shortage of building materials, the administrator said that many materials can be expected to remain in critical supply for "some time." However, he gave some encouragement regarding the shortage of nails when he reported that nail manufacturers were operating last month at a combined output of 55,000 tons—comparing with a total capacity of 65,000 to 70,000 tons for the entire industry.

Meanwhile, to speed up lagging production of temporary veterans housing, now critically needed in cities throughout the country and on college campuses by next September, the NHA announced it would approve "super priorities" on certain materials needed for that program.

The new priorities will be limited to cases of the greatest need, where stoppage of work is threatened within 30 days. They would remain effective "only for so long as necessary to prevent a shutdown on a particular project."

Shortages of necessary materials, NHA said, had been slowing down construction to the point where completion of the student-veteran housing program is seriously threatened. Since the program started, only 15,829 units have been completed. However, in the four weeks starting May 3, only 3,067 units were ready for occupancy, while in the last week of the period contractors completed only 429 units. In view of a record breaking enrollment of more than 2,000,000 students expected in U. S. colleges by fall, NHA decided to issue the priorities.

The CPA also announced creation of a super-HH preference for Federal Public Housing Authority use to obtain certain plumbing and heating fixtures for its veterans' temporary re-use housing program. Five items—lavoratories, water closets, sinks, steel shower stalls and 20- and 30-gallon gas and oil-fired water heaters—may be added to the list of scarce building components on which ratings now apply. A special high rating, which would have preference over HH ratings, would be authorized for procuring plumbing and heating items. Such a rating would be applicable to distributors only.

Other developments

Other moves toward furthering the housing program included the announcement that the CPA has established an emergency distribution system for steel in order to make a fair allocation between the housing program, farm machinery manufacturers and other needs.

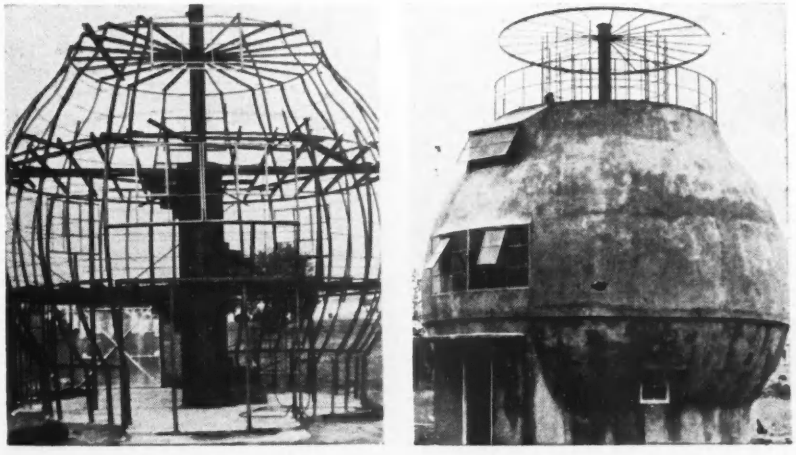
Commenting that steel will be critically short for all purposes during the next 60 to 90 days, CPA said that the new distribution plan has been set up under Direction 12 to the steel conservation order M-21, issued June 12, which provides for certified orders to be given preference in production and shipment by steel mills and warehouses. The direction applies only to steel in the forms and shapes listed in Schedule I of the order. It does not apply to wrought iron, iron castings or pig iron.

SET UP PREMIUM PAYMENTS FOR CLAY PRODUCTS, PLYWOOD

Wilson W. Wyatt, National Housing Expediter, last week announced formulation of Premium Payments Regulations 1 and 2, setting up a system of incentive payments, respectively, to manufacturers of structural clay and peeler logs for plywood.

The regulations were the result of conferences held in Washington between NHA and industry representatives (*ENR* June 13, vol. p 898).

Both regulations follow substantially a tentative plan submitted to manufacturers during the conferences. Regulation 1, covering face brick, structural clay tile, will be effective as of June 1, provides for payments of $5 for each 1,000 brick produced in excess of established quotas. Regulation 2, also retroactive to June 1, permits plywood manufacturers to pay a premium of $7.50 per 1,000 ft. logscale for peeler logs delivered. The manufacturers will be reimbursed if they meet certain production schedules set.



Housing solution?—A spherical, concrete-and-welded-steel, 3-story "dwelling", providing 2,000 sq. ft. of floor space, and designed to sell for about $7,000 is now under construction at Runnemede, Camden County, N. J. Being built by the Small Homes Research Corp., Havertown, Pa., the structure is a patented design by Robert L. Townsend, president of the corporation. The steel ribs are constructed around a large metal cylinder which carries a forced air gas heating and air conditioning unit and acts as a chimney. The flattened roof will act as a glassed-in solarium. Outer concrete wall will be painted.

Construction materials shortages grow

While the demand continued to mount as builders sought to get housing and industrial expansion projects under way, the squeeze on the already-slim supply of construction materials grew greater last week. A highlight was the sudden appearance of a shortage of cement in Florida.

Among the reports evidencing the tightening of supplies were:

Miami, Fla.—South Florida is experiencing an unprecedented cement famine which has brought postwar construction—both private and commercial—to a near standstill, a survey reveals.

OPA's ceiling price of 80 cents a bag on cement prohibits shipping in the material from great distances. Additional freight charges would bring the price in excess of OPA regulations.

Eighty percent of the concrete block and ready-mix plants serving Miami have closed. The state's only cement company, Florida Portland, at Tampa, produced 125,000 barrels during the first quarter of 1946, leaving a deficiency of 820,000 barrels needed from out-of-state producers.

Similar cement shortages are being felt in Tampa, Orlando and Fort Lauderdale, and at Jacksonville, where shortage of fuels was partially blamed.

Louisiana—The state highway department failed to receive any bids on highway projects for which lettings were held June 12. Not a single contractor in Louisiana has submitted bids during recents weeks on any highway projects. Six projects were re-advertised for bids for opening at the June 12 meeting.

Highway Director D. Y. Smith said that Louisiana contractors had told him they had not submitted bids because of the "unsettled labor conditions in the state, particularly in the Shreveport area, and because of shortages caused by strikes."

Dunkirk, N. Y.—Because contractors eport they are unable to obtain materials, with or without priorities, building construction here is at a standstill. Contractors agree that veterans' priorities mean little toward getting materials because dry lumber is not available and trying to dry green lumber is too expensive and slow. There is not even enough lumber for repair work. Brick, building blocks, drain tile and fiber boards are "impossible" to obtain, while plumbers say they are able to get only 25% of the bathtubs and fittings for which there is a demand.

Survey shows critical building material supply

(*Continued from page* 53)

bers are then again ripped to make 2 x 4 and other size lumber—and labor and other costs and profit being added to the price at each step.

Another dark spot is brick—and in this category was reported the only apparently sizable black market. Builders in every city reported black market activity in brick sales, with prices running more than double OPA rates. Structural steel is in very short supply, and concrete reinforcing bars are almost unobtainable.

In general, *ENR'S* correspondents reported more and more contractors turning to housing construction, as the one field where, with priority assistance, some sort of a building schedule can be maintained. They reported many industrial projects being cancelled, or completion dates put back, as the continuing material squeeze made work more uncertain.

Even the construction of homes for veterans, however, is falling sharply due to the shortages, the survey concluded.

BUILDING MATERIAL SUPPLY AND DEMAND, 12 CITIES

Material	0–25% below	25–50% below	50–75% below demand
Brick, common	5	5	2
Brick, face	2	5	5
Tile, hollow partition	5	4	3
Tile, bearing	5	4	3
Glass, plate	4	2	6
Concrete block (1)	7	2	1
Lumber, 1½" and under	2	3	7
Lumber, 2" and over	2	2	8
Lumber, heavy timbers	1	4	7
Plywood, 5-ply waterproof	1	2	9
Plywood, 3-ply	1	..	11
Steel, structural	1	5	6
Steel, reinforcing bar	1	3	8
Cement (2)	5	4	0

(1) Two cities report sufficient block available.
(2) Three cities report sufficient cement available.

Congress action on appropriations bills

(*Continued from page* 53)

the House and gives early consideration to two recently introduced bills, the Civil Aeronautics Administration will be able to make an early start on the $1 billion dollar airport program being planned in accordance with the recently passed law providing $500,000,000 of federal aid (*ENR* May 16, vol. p. 763).

The House has also passed a bill (H.R. 6741) which would amend the Airport Act to permit the construction of large fields to be started one year sooner than the law as now written permits.

Rivers and harbors

A rivers and harbors bill (H. R. 6407) authorizing 59 project with an estimated cost of $542,593,070 has been reported out by the Senate committee. This total compares with somewhat over $519,000,000 approved when the measure—which contains no appropriations—passed the House early in June (*ENR* June 13, vol. p. 897).

The Senate committee increased the authorized expenditure for the Arkansas River Basin from $95,000,000 to $150,000,000, but eliminated the Foster Creek Dam project on the Columbia River, for which the initial cost had been placed at $71,000,000.

Details on the long list of large projects included in the bill were given in the June 14, issue of *ENR*.

Federal-aid road program grows at steady pace

State highway departments let 425 contracts in May for federal-aid projects that will cost $58,166,360, as compared with a total of 392 contracts awarded in April for work costing $55,932,506, according to reports received by the Public Roads Administration.

The number of contracts awarded for federal-aid projects has increased each month since the beginning of the year. During the 5-months period from January 1 to May 31, a total of 1.230 contracts were let for approximately $185,900,000 worth of improvements on the federal-aid system. At the end of May, a total of 68 contracts for work costing $12,581,000 were under construction.

Reports of progress in the development of the federal-aid secondary road program showed a total of 2,851 projects programmed as of May 31 for improvements on 12,046 miles of roadway at an estimated cost of $217,109,681. The Federal contribution will amount to $109,783,343.

Congress favors building Delaware, other bridges

The U. S. Senate and House during the past week approved the construction of 18 highway bridges, including the proposed $25,000,000 bridge across the Delaware River south of Wilmington, Del.

To implement construction of this bridge, the state last year (*ENR* Oct. 11, 1945, vol. p. 471) created a Delaware River Crossing Division of the state highway department, under the leadership of Lt. Gen. Eugene Reybold, retired Chief of Engineers. The state legislature has already authorized a $25,000,000 bond issue to finance construction. The bridge would be a toll structure.

The remaining bridges authorized by Congress—three of them toll structures—include:

A toll bridge across the Rio Grande River at Rio Grande City, Tex.; a toll bridge over the Mississippi River at Cahokia, Ill.; either a toll or free bridge across the Ohio River at Cannelton, Ind.; either a toll or free bridge over the Wabash River near Mt. Vernon, Ind.

Other bridges include one over the Susquehanna and Hanover, Pa.; over the Rio Grande at Laredo, Tex.; over the Columbia River at Northport, Wash.; over the Des Moines River at Farmington, Iowa; over the Santee River at Leneudes Ferry, S. C.; over the Ohio River at Mauckport, Ind.; over the Wabash River at Montezuma, Ind.; over the Monongahela River at Elizabeth, Pa.; over New River near Radford, Va.; and over the Calcasieu River at Lake Charles, La.

Army civil works projects top $91 million by June

Army Engineers have let civil works contracts totaling more than $91,000,000 from V-J Day to June 1, 1946, the War Department announced last week.

Lt. Gen. Raymond A. Wheeler, Chief of Engineers, said the figures included 334 contracts for rivers and harbors and flood control projects.

The projects are scattered through 39 states, ranging from a solitary contract in some states up to 74 contracts in Louisiana—the largest number let in that period in any one state. Value of the work ranges from about $10,000 in some states to more than $21,000,000 in Oklahoma.

Largest individual contract let during the period is for the initiation of construction of a dam, power house and appurtenant works at Allatoona Dam on the Etowah River in Georgia. That project will cost $13,281,000.

TUCSON FLOOD DAMAGES ALLOWED AFTER 5 YEARS

It took a flash flood only a few hours to sweep through a section of downtown Tucson, Ariz., five years ago, but many hours had been spent in superior and supreme courts before Tucson's city council recently ordered payments to owners of six, damaged properties in accordance with a court decision.

Property owners maintained that the city shifted the course of Big Arroyo, the principal drainage channel through the downtown area, and, the plaintiffs, asserted, this caused the overflowing of the channel into the streets and business houses.

The state supreme court awarded six property owners $53,586.71.

Flood control project to start at Fresno, Calif.

Work is expected to begin shortly on a project to control floods in the Fresno, Calif., area, following settlement of a long controversy between the city and the county over financing the maintenance and operation of the project when completed.

Objections by the city to assuming a two-fifths of the maintenance costs had prevented approval of a state reclamation board contract that would release funds for purchase of land and rights of way. With final agreement reached by which the city will match the county proportion of 40 percent and Fresno Irrigation District and the town of Clovis to assume 15 percent and 5 percent respectively, Army Engineers were expected to start plans for construction at once.

Funds for building the Dry Creek flood control project, to prevent floods that threaten Fresno and northeastern rural areas, will be provided by the federal government under legislation authorizing the Army Corps of Engineers to do the work. Costs of maintenance are estimated to run about $10,000 annually.

California to build a $4,500,000 prison

State officials of California have authorized the purchase of 934 acres of land along the Santa Ava River four miles from Riverside where the state plans to erect a $4,500,000 medium security prison, with buildings to accommodate 700 inmates at first. It will be an intermediate vocational school to be operated by department of correction.

Interior Department reports on Colorado Basin

A comprehensive report looking toward full development of water resources of the Colorado River and expansion of the agriculture and industry in seven southwestern states has been released by the Department of the Interior.

The report sets forth opportunities for development of the Colorado River basin which would provide irrigation for thousands of acres of arid land, generate power for farms and industry, eliminate the danger of floods and provide other benefits. It presents an "inventory" of 134 potential multiple-purpose projects designed to provide maximum use of Colorado River waters.

Construction of the projects selected from among those listed in the report would bring approximately a million and a half acres of new land under irrigation, and in addition would provide additional water for approximately 1,122,000 acres now inadequately irrigated.

The report assumes that the water released for irrigation would be used also to generate the power needed for irrigation pumping, rural electrification and in stimulating development of mineral and other natural resources in which the region abounds. It is estimated that the power generating capacity of the potential projects in the basin will be more than 3,500,000 kilowatts.

Copies of the comprehensive report are not yet available for public distribution, but it may be consulted at offices of the Bureau of Reclamation.

Quabbin reservoir filled a year ahead of time

The great Quabbin Reservoir in central Massachusetts (*ENR* Sept. 1938, vol. p. 342) is filled to overflowing a year ahead of time. In the presence of Metropolitan District Commissioner William T. Morrissey, the engineers who worked on the vast project, and various state officials, the "stop logs" were raised on June 22.

The project was begun 15 years ago, about 25 years after the first surveys were made. During four of the last five years some water has been flowing from Quabbin through the 24½-mile tunnel into the small Wachusett reservoir to bring the latter up to the desired level.

Quabbin Reservoir covers 39 square miles, and has a storage capacity 415,000,000,000 gal. Quabbin is a part of the Metropolitan Water System that supplies Boston and more than 20 cities and towns in suburban areas north of Boston, which use an average of 163,000,000 gal. daily.

Union men get 3-6 years in N. Y. extortion case

Martin J. Parkinson—business agent of Local 137, International Union of Operating Engineers—and William J. McGeory—President of the Building and Construction Trades Council of Westchester County, New York, as well as business agent of the Steam-Fitters Local 543—were convicted of attempting to extort $200,000 from construction firms working on New York City's Delaware Aqueduct, and were sentenced, June 24, to three to six years in prison.

An additional three to six years was imposed on another count of attempted extortion, but sentence was suspended on condition that the men sever all connections with labor unions.

The trial of Parkinson and McGeory grew out of the successful prosecution of James Bove and Joseph Fay, AFL leaders, with whom they were associated, and who were convicted of conspiracy and extortion (*ENR* March 22, 1945, Vol. p. 370).

According to testimony at the trial, Parkinson and McGeory were involved in demands for $100,000 from each of two firms which held contracts on the $200,000,000 aqueduct—the Dravo Corp. of Pittsburgh and Foley Brothers, associated with Pleasantville Contractors of Westchester. Officials of the two companies testified that Parkinson and McGeory threatened strikes and other disturbances if the $100,000 was not paid by each contractor.

The court dismissed a third count in the indictment, involving extortion of $4,200 from the W. E. Callahan Construction Co. of Nebraska, because of the inability of the principal prosecution witness to appear.

The two men faced possible maximum prison sentences of seven and one half to fifteen years on the two counts, but the court reduced the sentence on their pledge to abstain from union activities.

Truman signs hospital, planning bills for VA

A third deficiency bill (H. R. 6601) authorizing the Veterans Administration to enter into hospital construction contracts to the amount of $441,250,000 has been made law by the addition of the President's signature.

The measure also provides $35,000,000 for the Bureau of Community facilities of the Federal Works Agency for aiding local public works planning organizations.

Details regarding the bill were given in *ENR* June 20, vol. p. 957.

STATE MAY CUT TIMBER

Governor Mon C. Wallgren of Washington has requested the state's attorney general for an opinion on whether the state could legally cut its own timber and furnish a sawmill. The state is faced with a serious timber shortage to replace and repair bridges and is considering cutting its own timber for this purpose. An estimated 1,800,000 bd. ft. is needed, Governor Wallgren said.

To make 1,000-acre lake in Pinellas County, Fla.

What is said to be the most important conservation project in the history of Pinellas County, Fla., will start July 2 when contracts will be awarded for a dam and roadway across the mouth of Long Bayou at the entrance of Boca Cioga Bay on the Florida west coast.

Impounding of the bayou headwaters will create a large fresh water lake. The resulting one and one-third billion gallon body of water will act as a protection from low temperatures which might damage citrus fruit.

Also, it will form a reservoir for irrigation of farms and groves.

The lake will cover 1,000 acres of worthless tidewater land, and within a year will be stocked with several kinds of fresh water fish, thus providing added sport for fishermen.

The Long Bayou Dam will be first of a series of six similar projects, all to be completed within a 2-year period, which will control outflow of fresh water from many Pinellas County streams. The resulting basins and lakes, it is said, will go far toward restoring the water level now greatly lowered by a half century of overdrainage.

Cape Girardeau highway bridge brings $2,370,000

The Mississippi River highway bridge at Cape Girardeau, center of a heated controversy in southeast Missouri, has been purchased by the Cape Special Road District for $2,370,000, it was announced June 10.

By law, the bridge in 1948 would have been placed on the market for its original cost of $1,505,178 less depreciation, but the three commissioners representing Cape Girardeau citizens said they were convinced revenue from increased toll receipts made purchase at the present price advisable. The Alexander County, Ill., Board of Commissioners had attempted to buy the bridge.

American firm to build power plants for China

A contract to design and supervise construction of seven small central electric power generating stations for China has been let by the Chinese Supply Commission to Gilbert Associates, consulting engineers, Washington, D. C., successors to W. S. Barstow & Co. The size of the plants has not been definitely determined but it is expected that the initial installations will be 10,000 kw. or under.

The new plants are part of China's electrification program. Equipment for them will be built in this country and shipped as soon as possible. Gilbert Associates will have charge of the erection of the plants and probably will supervise their operation initially.

Construction of many such small power plants throughout China was recommended by the experts sent there by our Foreign Economic Administration as a first step in building a power market.

Cause of Arizona drought shown by snow gage

Additional data on the current Arizona water shortage (*ENR* April 18, vol. p. 529) are provided by the snow storage gage on Mount Baldy—the 11,420-ft. head of the river basin supply in the Salt River system. The mountain area is not only headwaters for the tributaries of the Salt, but also is an area where tributaries of the Gila and Colorado rise.

This highest weather station in Arizona traces the beginnings of the drought through last year, according to E. L. Felton of the U. S. Weather Bureau at Phoenix, who has returned from a semi-annual gage reading. The gage was established by the weather bureau at the 11,200-ft. level in October, 1942.

Felton and J. A. West, chief hydrographer, Salt River Valley Users Association, who make the trip twice a year, found the mountain has received 29.66 in. of moisture through the past year.

Felton said that in a desert country the critical band in the amount of precipitation necessary to produce forage crops and supply the storage reservoirs is very narrow—amounting at most to two or three inches.

Indication that the drought was well under way last year was shown in the June to October span which had only 13.74 in. of moisture in the gage, while the comparable period in 1944 was 19.83 in. The 15.92 in. which fell from last October to the present time was the smallest amount in a like period since the gage was established.

Los Angeles reveals major building plans

School building to total $50 million, playgrounds and other work planned if bond issue is approved

The Los Angeles, Calif., board of education will launch a $50,000,000 program of new school and replacement construction, after district voters approved a $75,000,000 bond issue at an election June 4. About a third of the total will be required for land purchase and improvements.

Included in the program are 30 elementary and 10 secondary schools, additions to between 25 and 50 existing schools, and replacement of between 200 and 300 of the district's 1,000 bungalow-type classrooms. Of the 300 elementary schools now in use, 60 need new construction.

Surveys have shown that the district now has 28,000 more children of elementary school age than were counted in 1942, and there are 40,000 more below the age of 5 years than there are between 5 and 10 years old—indicating an increase that must be provided for by 1950. There are 14,000 pupils now attending half-day sessions because of a lack of classrooms.

$12,000,000 for playgrounds too

City built and operated recreational facilities will be doubled when recently-announced plans by the Los Angeles Board of Playground and Recreation Commissioners are carried out. The program will require expenditure of an estimated $12,078,344 for two beach developments, 30 playgrounds, 13 recreation centers and three youth's camps.

Mayor Fletcher Bowron suggested a referendum be called seeking authority for an increase in the city's general purpose bonding power, from the charter-limited 3 percent to 15 percent of assessed valuation. He pointed out that the publicly-owned Department of Water and Power has authority to issue bonds up to 12 percent of the assessed valuation of its district.

City has 9 other major projects

Bond issues totalling $44,375,000 will be submitted to voters of Los Angeles County, at a special election Aug. 6, for funds with which to proceed with nine major county projects, ranging from beach improvement to an "escape proof" county jail.

Beach improvements totaling $8,200,000 are proposed for the Long Beach and Santa Monica-West Bay areas. The Long Beach plans would expend $2,700,000 for a model beach park, and those for Santa Monica-West Bay work would require $4,100,000. The $1,400,000 balance of the $8,200,000 would be expended for construction of groins, pumping sand, rehabilitation of beaches, and purchase of land.

A $6,000,000 bond issue included in the list would cover purchase of an existing incinerator at Pasadena and construction of 10 others, strategically scattered over the county, in an attempt to reduce smoke haze now common in the city and many of its suburbs.

Other items for which bond issue approval will be sought include a $19,000,000 county building in the civic center section of downtown Los Angeles; a $2,000,000 Juvenile Hall; $4,900,000 "maximum security" jail; $2,600,000 for county museum improvements, $400,000 for Hancock Park development work and building; and $1,275,000 for new buildings to house the county-owned and operated Otis Art Institute.

Indian Service names Col. Pryse district chief

Col. E. Morgan Pryse, former commanding officer of the 924th Engineer Aviation regiment, has been appointed director of one of five newly-created Indian Service district offices the Department of the Interior announced.

Colonel Pryse, was released to inactive duty last April, when he returned to his position as director of roads in the office of Indian Affairs. In his new position, he will supervise the district in Washington, Oregon, Idaho, California and Nevada.

Colonel Pryse joined the Army as a private in 1917 and was commissioned a year later. In 1940 he was recalled to active duty. He served as engineer in the British Eighth army and in the Ninth Air Force in the Middle East. He also participated in the Normandy invasion in 1944.

Entering the Indian Service in 1920, he was engaged in forestry work until he became director of highways in 1933.

New York, St. Louis plan major school construction

In most American communities expenditures for education top the list of prospective construction projects.

Typical of such plans are those just announced by New York City and St. Louis, Mo.

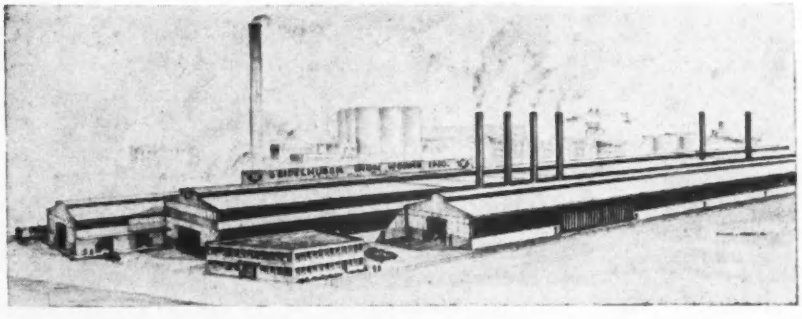
In New York on June 17 the board of education took the first step toward realization of its $130,000,000 postwar building plans when it advertised for bids for construction of an addition to Junior High School 35 in Brooklyn. The board also announced an expedited program of building and repairing to start in a few months. The new construction will be the first since 1941.

The board has selected for immediate advancement nine other building projects to provide classroom accommodations for nearly 15,000 children in the city's five boroughs.

A 5-year plan in St. Louis

The planning committee of the Board of Education of St. Louis has drawn up a 5-year expansion and modernization program for the local school system that will cost $65,264,917, if the projects meet the approval of the board and the voters of the city. It is estimated that an additional annual tax levy of 33 cents per $100 would be needed for principal retirement and interest on the $65,000,000 program proposed. The present school tax rate is 89 cents per $100.

Major proposals in the program, which would begin July 1, 1947, at the earliest, are: Construction and completion of 29 new elementary schools, two new high schools, one technical high school, two field houses, two new stadiums and an administration building, $35,157,796; alterations, improvements and equipment, $27,281,191, including additions and structural alterations to existing school buildings and other structures, $10,204,011.



***Seattle Steel Plant to Cost $3,500,000**—Establishment of a steel rolling mill in the center of Seattle, Wash., has been announced by Seidelhuber Iron and Bronze Works. Engineering Associates of Seattle is preparing plans for three buildings, 66 x 1,200 ft. each, of steel and reinforced concrete, an administration building, and yards, warehouses and ship and rail loading facilities.*

ENGINEERING SCHOOL NEWS

Results of student questionnaire at Rensselaer—Applied mathematics at Carnegie—J. H. Potter assistant dean at Johns Hopkins.

"Are student-faculty relationships satisfactory?" asked the Rensselaer Polytechnic Institute in a recent student questionnaire. Seventy-four percent of the students said they were. Only 26 percent disagreed.

The students were asked to rate, in order of importance, the factors contributing to their estimate of a professor. Most important, said the students, is his personality and manner in the classroom.

The second most important factor is how fair he is in grading. Next, the books and articles he writes, his degrees, and in last place, his official rank in his department.

Ninety-four percent of the students voted that campus forums for discussion of international and national issues are important.

Eighty-three percent stressed the value of organized debating contests with representatives of other colleges.

The students listed many factors as contributing, in their opinion, to produce a favorable general reputation for a science and engineering school, but the principal items were ability and success of graduates, reputation and experience of teachers, and research facilities and achievements, in that order.

Asked their preference on teaching methods, sixty-one percent favored the discussion method, nineteen percent the lecture method, while ten percent preferred a combination of the two, and ten percent returned conditional answers.

The Johns Hopkins University has announced the appointment of Assistant Professor James H. Potter as assistant dean of the faculty of engineering. Professor Potter received his undergraduate training in the department of mechanical engineering at Columbia University, having been graduated in 1935. A year later he was admitted to the master's degree by the same institution. After four years of industrial work in the chemical and shipbuilding fields he joined the engineering staff of Johns Hopkins.

A new department of applied mathematics has been established in the College of Engineering and Science at Carnegie Institute of Technology. The unit was formed in a reorganization of the departments of mathematics and mechanics. The mechanics section will be discontinued on July 1.

Twenty-one men have just completed a graduate course in traffic engineering at Yale University. The course required a full academic year of graduate study in such matters as the basic theory and practice of traffic regulation, design, planning and administration, dealing with problems of safety and expeditious movement in highway transportation.

"The training of these men and their return to active positions in public service is especially timely in view of the rising toll of traffic accidents and the waste of community resources through congestion", said Professor Kent T. Healy, chairman of Yale's committee on transportation, in commenting on the work, and he added, "These men come from all parts of the United States, from the three Pacific coast states to Texas, Florida, North Carolina and Virginia, as well as the northeastern states, including Connecticut. In addition, the province of Quebec and the city of Montreal on the north, and areas as far west as Hawaii, were represented. Three of the men came from China."

The students represent various branches of state highway departments and city agencies. They came from state highway traffic engineering departments as well as planning, design, maintenance and bridge divisions. The men from urban areas came from traffic engineering divisions, departments of public safety, and city planning commissions.

A new department of engineering mechanics will be established at the University of Texas. The board of regents recently approved the faculty council's recommendation for the new degree course in that subject.

The university, with enrollment already at an all-time high of 12,500, expects 18,000 registrants for next fall's opening. Scholastic requirements for out-of-state students have been raised to restrict their attendance.

Carroll C. Wiley, professor of civil engineering, University of Illinois, and director of the short course for highway engineers for a number of years, has resigned as city traffic engineer of Champaign, Ill., but will remain as a member of the traffic commission. He was graduated in civil engineering at the university, and, with the exception of one year, has remained continuously in the department, giving instruction in highway engineering, and, in more recent years, in railroad civil engineering.

Robert H. Dodds, former editorial assistant on the *Engineering News-Record*, has joined the civil engineering department at Colorado A. and M. College, Fort Collins, as an associate professor. He was separated recently from active duty as a lieutenant commander in the C.E. Corps of the Naval Reserve. He worked on naval shore construction projects in the New York area from January, 1942, to September, 1944. From October, 1944, to May of this year he was in the Bureau of Yards and Docks at Washington, working on the World War II history of that bureau, which is to be published in the near future.

***Apartment Project at Georgia Tech.**—Shown here is an architectural rendering of one of the apartment projects which will be constructed for Georgia School of Technology at Atlanta, Ga., as part of a $3,200,000 program to provide accommodations for returning veterans. Burge and Stevens of Atlanta prepared plans for this particular project, which involves construction of 17 three-story apartments. There will also be an 8-story building.*

OBITUARY

William David Pence, 80, of Evanston, Ill., consulting engineer, died June 16. He was a graduate of the University of Illinois. After service as a resident engineer on the Santa Fe Railroad, he became professor of civil engineering successively at the University of Illinois, Purdue University and the University of Wisconsin. He was chief engineer of the Wisconsin Railway Commission and Tax Commission from 1906 to 1913, when he became a member of the engineering board of the Interstate Commerce Commission for federal valuation of railways.

Joseph M. Badger, 65, recently retired engineer of the Waltham, Mass., water department, died at Natick, Mass., on June 16.

Theodore A. Adle, 56, a field engineer for the Bell Telephone Co. by whom he was employed for the last 36 years, died June 11 at Norristown, Pa.

Thomas J. Carroll, 68, construction engineer employed by W. W. Lindsay and Co. for 35 years, died June 5 at Philadelphia, Pa.

Henry Lafavour, 83, a member of the Massachusetts emergency public works commission in 1933, and for many years president of Simmons College, died in Boston on June 16.

John C. Hoyt dies; authority on water

John C. Hoyt, 72, retired consulting engineer to the Water Resources Branch of the U. S. Geological Survey, died June 21 at Paris, Va. He was a pioneer in building up the Water Resources Branch of the survey, and was widely known for his writings on hydraulics.

Born in LaFayette, N. Y., Mr. Hoyt was graduated from Cornell University in 1897 and spent five years in a variety of engineering work before joining the computing section of the Water Resources Branch. In 1907 he was appointed assistant chief hydrographer, and from 1911 to 1930 he was chief of the surface water division. He was then named consulting engineer, from which position he retired in 1944.

Mr. Hoyt's enthusiasm and aggressiveness were responsible for much of the growth and expansion of the Water Resources Branch. He helped to put the work on a continuing basis through the inauguration of a 50-50 cooperative arrangement with the states for the maintenance of gaging stations. He also got Congress to recognize the federal interest in key gaging stations and persuaded the states to let gaging be done by the staff of the Geological Survey.

Mr. Hoyt represented the United States at the World Power Congress in London in 1924, and was a delegate to the World Navigation Congress in Cairo in 1926, and to the World Engineering Congress in Tokyo in 1929.

Dean of the engineers in federal service, Mr. Hoyt led a long and ultimately successful fight to have the American Society of Civil Engineers set up the District of Columbia as a separate district with representation on the society's board. He served the society both as a director and a vice-president.

Surplus machinery sale at Cincinnati, July 8

More than ten million dollars worth of government-owned construction equipment, consisting of various sizes of jack bits, steel rods, pneumatic tools and accessories, in addition to several hundred items of construction machinery in new and used condition, will be offered for sale at Cincinnati, Ohio, on July 8.

A few items will be offered at fixed prices and the rest to be sold on a spot bid sale basis. Large quantities of parts for construction machinery will be offered.

This sale will be conducted at the Cincinnati Music Hall, Central Parkway.

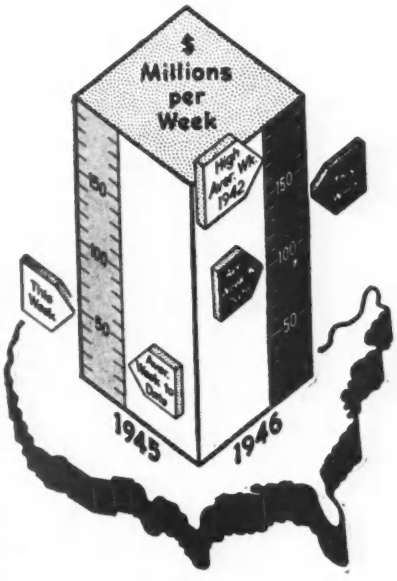
Bill provides for roads atop dam structures

A bill that would provide for construction of highways across the tops of dams built by government agencies—to be built at the government's expense excepting for approach structures and rights-of-way—was passed by the House of Representatives recently and sent to the Senate for action.

The bill (H. R. 6324) provides that any government agency having "jurisdiction over and custody of" any dam to be owned by the U. S. Government shall be authorized to construct such dam so that it will serve as an adequate foundation for a public highway or bridge across the dam, provided that highway commissioners of the states in which the dam is located and the Commissioner of Public Roads certify that such a bridge or highway is necessary and desirable.

A sum not to exceed $10,000,000 is authorized for use at the discretion of the commissioner of public roads for use as an emergency fund to reimburse the agencies for added expenses they may incur in design and construction of dams.

CONSTRUCTION ACTIVITY



As Reported this week to... *Engineering News-Record*

CONTRACT VOLUME

Continental U. S. Only (Thousands of Dollars)

	Week of June 27 1946	Cumulative 1946 (26 wks.)	Cumulative 1945 (26 wks.)
Federal	$15,544	$313,702	$487,306
State & Mun.	29,052	639,745	131,994
Total Public	$44,596	$953,447	$619,300
Total Private	84,010	1,678,739	256,855
U. S. Total	**$128,606**	**$2,632,186**	**$876,155**

WHERE CONSTRUCTION ACTIVITY ORIGINATED THIS WEEK

Dollar Volume (Thousands)

Type of Work	This Week	Cumulative 1946 (26 wks.)	Cumulative 1945 (26 wks.)
Waterworks	$1,245	$46,316	$19,797
Sewerage	1,593	45,813	14,623
Bridges	4,950	63,937	12,884
Highways	14,438	358,836	94,212
Earthwork, Waterways	8,857	194,714	19,871
Buildings, Public	6,989	162,959	305,727
Industrial	15,357	526,915	180,751
Commercial	67,198	1,042,741	44,290
Unclassified	7,979	189,955	184,000

NOTE: Minimum size projects included are: Waterworks and waterway projects, $22,500; other public works, $40,000; industrial buildings, $55,000; other buildings, $205,000.

NEW PRODUCTIVE CAPITAL

	Cumulative 1946 (26 wks.)	Cumulative 1945 (26 wks.)
NON-FEDERAL	$509,078	$288,741
Corporate Securities	196,391	79,670
State and Municipal	312,687	186,471
RFC Loans	.....	22,600
FEDERAL	158,320	251,010
Total Capital	$667,398	$539,751

ENR INDEX NUMBERS

Index Base = 100		1913	1926
Construction Cost	June 1946	347.91	167.24
Building Cost	June 1946	264.16	142.80
Volume	May 1946	284	125

EDITORIALS

VOLUME 136 NUMBER 26

June 27, 1946

Venturi and Herschel

THIS YEAR is the 200th anniversary of the birth of the Italian hydraulician, Giovanni Battista Venturi. Among other things, he formulated the important principle that fluids under pressure, in passing through converging pipes gain speed and lose head, and vice versa for diverging pipes. We remember and applaud this scientific contribution of Venturi. But in doing so we must likewise give equal recognition to a great American engineer without whose efforts the name of Venturi would have been buried in oblivion. It was Clemens Herschel who in 1887 invented a measuring device that provided a practical application of Venturi's natural law, thus providing the world with a flow instrument that has no peer for simplicity, accuracy and ruggedness. "Out of respect for Venturi's experiments," wrote Mr. Herschel, the device was named the Venturi meter. Thus with a display of self-effacement that is rare Mr. Herschel coupled the name of a long-forgotten engineer with his invention and gave credit to the man who had pointed the way. Few men are endowed with the mental sagacity of a Herschel, but all might emulate his generous spirit; to be niggard in sharing credit for professional achievements shows lack of character without which an engineer cannot truly discharge his complete responsibilities. Thus in honoring Venturi we find good reason to pay double homage to Herschel whose engineering contributions were second only to his respect for the efforts of others.

Toward Better Earthfills

THE POSSIBILITY of greatly reducing the damaging percolation of water through or under levees is foreshadowed by Mississippi River Commission experimentation with puddle-filled trenches cut through old embankments along the centerline and along the riverside toe, as outlined elsewhere in this issue. What such development could mean in maintenance dollars saved is evident from the hundreds of miles of levees that line our river systems. Moreover, the puddle-filled trench would seem to have another potential use in stabilizing the tops of old earth dams whose soggy consistency has often been the harbinger of trouble below. Also the impervious cores in new dams could be installed by progressive trenching as the fill was raised; in rolled earth dams the expensive segregation of materials could be reduced, and in hydraulic fills the uncertainties that now surround the tightness and extent of the core could be eliminated. The principal present difficulty with the trenching procedure is a lack of deep-digging trenching machines, say up to 35 or 40 ft. On the recent experiments a dragline was used below conventional trencher depths of 20 ft., but with consequent increases in cost and time. Development of a large capacity machine that would do the trenching in one operation would eliminate these disadvantages. The puddle-trench method thus presents a challenge to equipment manufacturers to develop a deep trencher as it does to engineers and construction men to apply it intelligently in the interest of more permanent earth embankments. The promise of substantial gain makes the challenges worth accepting.

Good Neighbor Sanitation

AN OUTSTANDING opportunity for development of good neighbor activity between the United States and Mexico offers itself in the field of sanitation. It seems strange that we have not been on more intimate terms with our neighbor to the south despite marked activity in such matters with Canada. Some observers believe that if the American Public Health Association had shown aggressive interest in sanitation problems along our southern international boundary perhaps there would not have been need for a separate organization, the U.S.-Mexican Border Public Health Association, whose activities were mentioned in a recent issue. With the greatly improved facilities for radio, airway and highway interchange there is every justification for the promotion of closer relations with our next-door neighbors in Mexico.

Bond Issue Folly

TIME WAS WHEN HIGHWAYS, financed on long-term bond issues, were likely to go to pieces long before the bonds could be paid off. In time the lesson was learned and highway financing is now better managed. But have we learned correspondingly about other public works financed by bond issues? A coastal city that raised $600,000 with which to build a breakwater protecting its harbor and bathing beach, did so with a bond issue to be paid off in 38 yr.

Less than half that period of time has elapsed and the breakwater is now so damaged and broken by heavy seas that its repair is estimated to cost several hundred thousand dollars. In any public work planned for a long period of service it would be well to (1) make its design and construction the best possible, (2) take every precaution to insure a period of service at least equal to the life of the bonds and (3) provide for adequate maintenance throughout the life of the facility.

Constrictions in the Bottleneck

AS A RESULT OF STRIKES and threats of strikes, the bottleneck to progress in veterans' housing as well as other types of construction has become smaller than ever. A survey of availability of building materials in a dozen representative cities, reported in the news pages of this issue, presents the situation clearly. It is far from satisfactory.

Pointing it up plainly, also, was the recent action of the Civilian Production Administration in drastically restricting authorizations for construction projects other than housing. Although some such tightening was inevitable, the loss in production—and general business confidence—from strikes and work stoppages brought the restrictions sooner and in more severe degree than would otherwise have been necessary.

Now that there is possibility of a breathing spell from work stoppages, every governmental aid should be given to increase the production of building materials. That has always been the chief requirement—really the only one—for housing and all other types of construction. Yet none of the governmental agencies—CPA, OPA or the Housing Administration—has faced it resolutely, however much they have seemed to battle for that goal.

To correct this situation the CPA should cut housing priorities to a realistic balance with available materials to prevent too many "starts" that cannot be finished. OPA should speed up the process of putting its ceiling price adjustments into effect. And the Housing Administration might well direct more of its energy to seeing that existing plant production is brought to capacity rather concentrating on the subsidy plan for new plants whose production may be a long way off.

Until this problem of increased materials production is faced, almost to the degree of forsaking all others, constrictions will continue to develop in the bottleneck.

Perspective on Exports

DESPITE wide realization of America's commanding position and responsibilities in a world that daily grows smaller and more interdependent, there is still too wide a tendency to regard foreign trade as something alien and extra to our economy. Public opinion polls invariably return a favorable attitude toward exports, but a narrow view too often characterizes definite proposals for maintaining or expanding them. For example, there was general acclaim recently when the Civilian Production Administration cut the export quota on lumber to 2 percent of production as compared to a pre-war average of 4.6 percent. The CPA action was based on our overwhelming domestic requirements for lumber for housing and other essential uses, and may indeed be justified, but a more mature and realistic attitude would have been to regret the necessity for cutting exports rather than to revel in it.

In the postwar world America must export more than it ever has before, both to raise the national income to necessary levels and to secure in exchange products that cannot be produced at home. The British know this so well that they are willingly if not happily maintaining their low-standard war-time living conditions until their exports can be expanded.

American engineers and construction men should be among the first to have a proper perspective of exports. Many types of lumber are only available abroad. Hemp rope is not a domestic product. Neither is tin, while copper and lead supplies need to be supplemented by imports. Beyond construction supplies, of course, we have to import foods, medicines and textiles. All of these products can be paid for only by our exports. And in the broadest sense, our own interest lies in helping devastated foreign countries to be rebuilt so that they will once again be good customers. This too, means exports.

Even though present material shortages and price conditions require that we keep export quotas under careful control the long term considerations with respect to the value and need of increasing our exports should not be forgotten.

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Loading With Water to Design Capacity Forces Steel Cylinders Below Driven Depth

***Contents in Brief**—Wartime construction of a high-priority, 80x1,300-ft. wharf supported on steel cylinders was delayed and made more difficult by absence of expected bearing values in the foundation. This led to unusual preloading tests in which the cylinders were forced down to safe depths and actual load-bearing capacity was tested with the aid of large tanks filled with water*

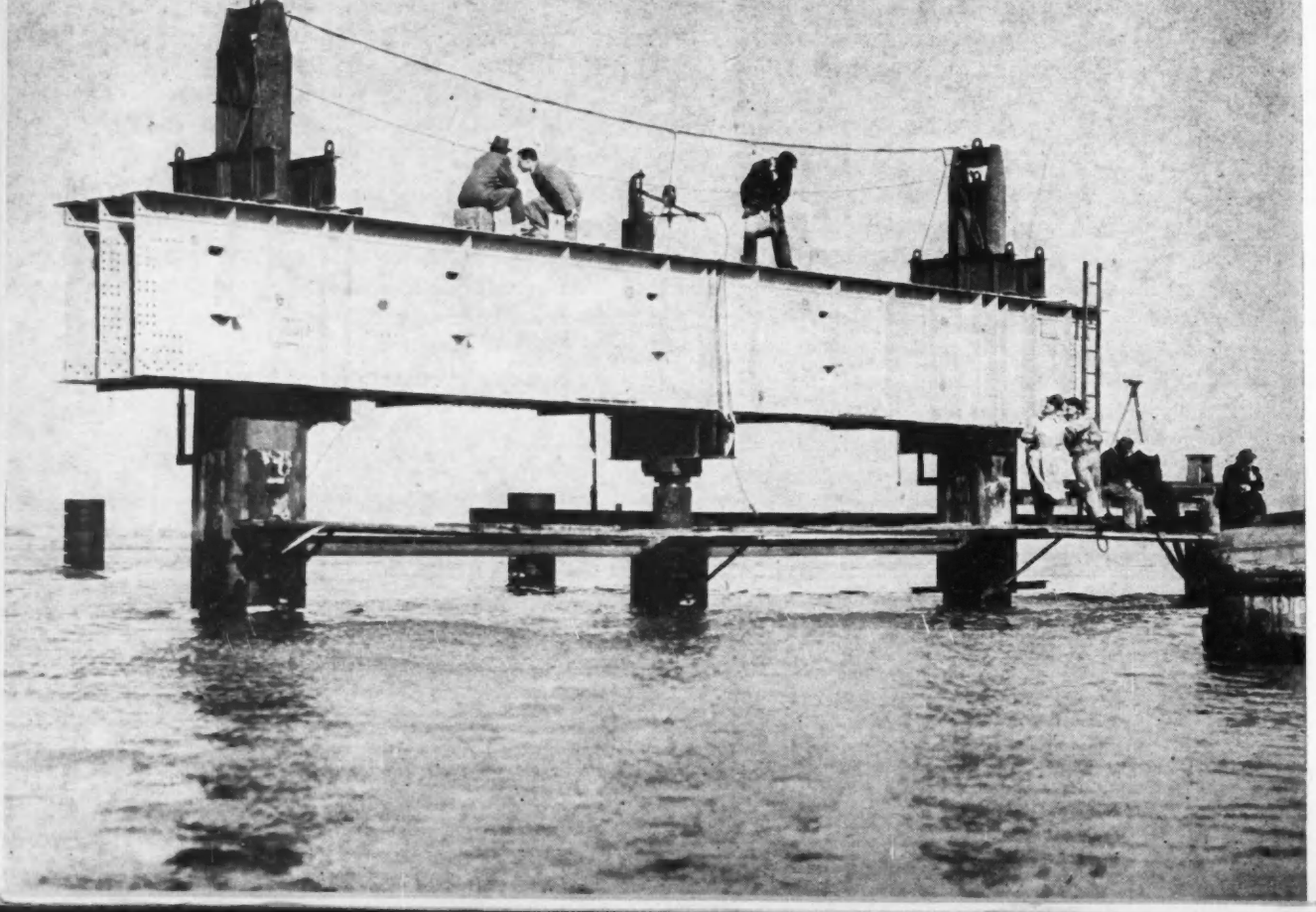
UNEXPECTEDLY soft foundation led to cautious methods of construction and unusual preloading tests to safeguard an 80x1,300-ft. wharf built recently on San Francisco Bay at the plant of the Bethlehem Steel Co., shipbuilding division. The wharf was built as a repair base for deep water ships and part of it is reserved for a 14,000-ton floating drydock. The wharf, designed for a live load of 500 lb. per sq. ft. is supported on 108 steel cylinders, 3 ft. in diameter, that were to be put down to rock originally reported as being at a depth of 138 ft. When later developments showed no adequate foundation at 150 ft. the cylinders were forced on down, ultimately to more than 200 ft. as a maximum.

As the cylinders went down to the greater depths, bearing values of the material at the bottom were tested, first by means of a steel H-beam placed inside the excavated cylinder where it was jacked down against the skin friction of the cylinder. A second method of testing was to place a steel girder across a row of three of the cylinders, fasten the girder down to the outer two and put jacks against the under side of the girder to develop load on the middle cylinder.

The third and most spectacular method, under which cylinders were put down still farther and were finally tested, was carried out with the aid of steel tanks supported on the cylinders and filled or partly filled with water to develop load.

The original foundation exploration consisted of only five 4-in. dia. wash borings made through water from a floating drill rig and carried down to

Fig. 1. Preliminary tests of bearing value were made with a steel girder across three cylinders using a jack bearing against its under side to develop load on the middle cylinder.



138 ft. below mean lower low water. Unfortunately, results of these borings were misinterpreted and it was erroneously reported that rock would be encountered at this depth.

Four alternate designs for the pier were submitted for bids, one of which provided for steel cylinders. In proposing use of these cylinders it was assumed that the foundation would provide adequate support for the resultant load concentrations. The low bid as well as a shorter time estimated for construction favored the cylinders, and under the pressure of wartime emergency every endeavor was made to expedite construction. This same urge for speed was again a factor when the cylinders went on down beyond the depth where rock was expected.

By the time the true nature of the foundation was discovered, high priority of an urgent wartime Navy project had brought to the job about half of the steel cylinders and work was well under way on the fabrication of steel girders and floor system. As it was highly desirable to complete the structure as originally planned, decision was made to drive the cylinders on down to such additional depth as would be necessary to develop the required bearing value. Accordingly, the lengths of the cylinders were increased by welding on additional sec tions.

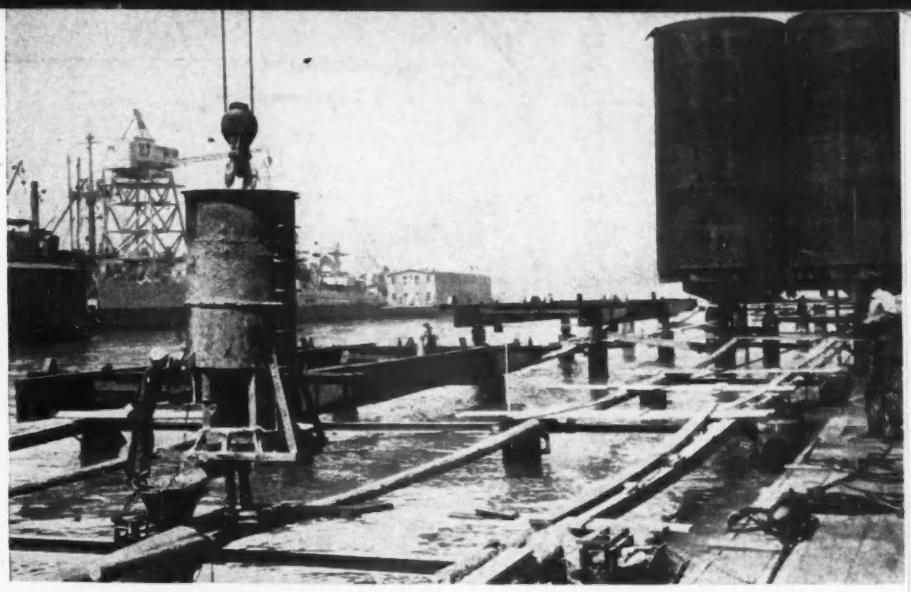


Fig. 2. A group of four water tanks were used to apply loads up to 385 tons on each of four cylinders to test load-bearing capacity. Frames at left are typical of those used to support the tanks over two piles in each of two bents.

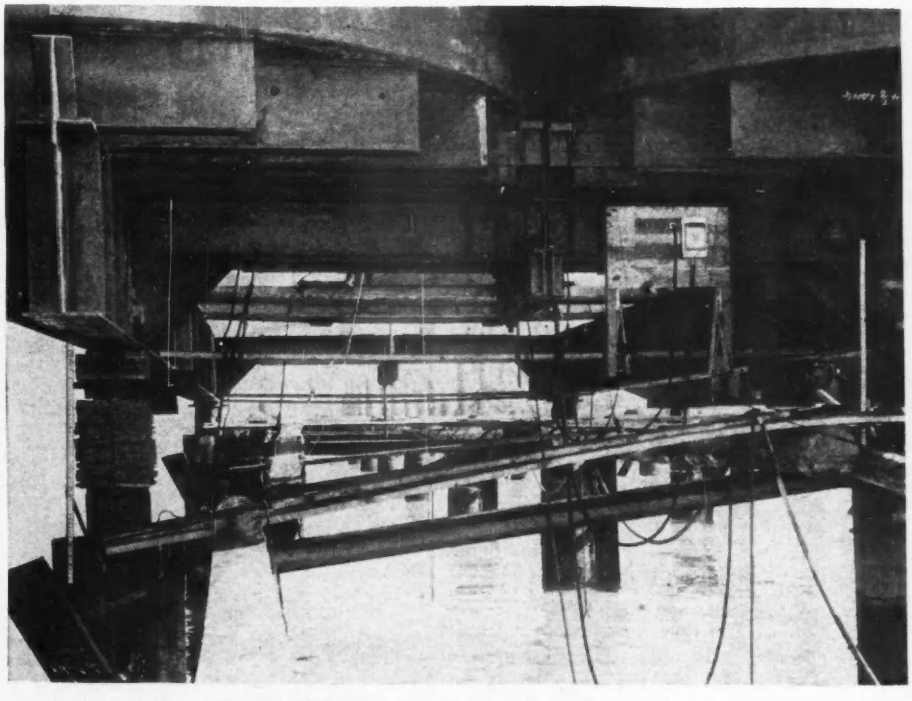


Fig. 3. Under side of loaded platform. Cylinder at left is down more than others and shims have been placed atop the jack to keep platform level. Note tie beam between cylinders and level rods for reading rate of sinking. Bottoms of the steel tanks appear near the upper edge of this picture.

Driving the cylinders

The contractor drove the first four cylinders in bent No. 1 with the aid of excavation carried on inside the cylinder. This was done with a jet under 300-psi. pressure, which agitated the material so that it could be removed by an air-and-water lift. A No. 0 Vulcan hammer was used in driving the cylinders as excavation continued. It was found impracticable to excavate on the inside of the cylinder at depths beyond 150 ft. and the cylinders were not cleared beyond this depth. The tests demonstrated the fact that excavation inside the cylinders need not be carried all the way down. Material contained within the open end of a deeply driven cylinder was trapped in such a way that it afforded full bearing value.

An advantage in the steel-cylinder type of foundation, the designers pointed out, is that where unexpectedly low bearing values are encountered at the designed penetration, the inadequacy can be corrected by simply adding to the cylinder length and driving deeper. Cylinders can be lengthened readily and no other redesign is necessary. Driving was continued on each cylinder until the penetration was no more than $\frac{1}{16}$ in. per blow for the last foot of driving.

Observations on driving the cylinders made by the consulting engineers on the project showed that results were in fairly close agreement with the "old Dutch formula" for ultimate capacity of driven piles. However, in applying this formula corrections were made for energy losses represented by (1) the rebound of the hammer and (2) temporary elastic compression in the cylinder plus elastic yield of the surrounding soil.

The hammer rebound, it was found, could be measured within $\frac{1}{2}$ in., which

was considered close enough, by turning off the steam, letting the ram fall free and visually observing the rebound. With a 7,500-lb., single-acting ram the rebound was about 3 in. when penetration was about $\frac{1}{8}$ in. per blow. Elastic compression in the steel shell plus yield in the soil varied from $\frac{3}{16}$ to $\frac{3}{8}$ in.

The "old Dutch formula" as modified by h_1 and C for these calculations is as follows:

$$R = \frac{W_r(h - h_1)}{s + \frac{1}{2}C} \times \frac{W_r}{W_r + W_p}$$

Where: R = Ultimate capacity of the pile in pounds.
W_r = Weight of the ram in pounds.
W_p = Weight of the pile or cylinder in pounds.
s = Penetration in inches, under the last blow of the hammer.
C = Temporary elastic compressions in the pile and elastic yield in the surrounding soil in inches.
h = Free fall of the ram in inches.
h_1 = Rebound of the ram in inches.

Penetration tests

When the penetration under what should have been the last blows of the hammer was excessive, additional samples were taken from the foundation (using a cable tool sampler rig) and no solid rock formation was found. Subsequently the jet was put down to —225 without meeting solid resistance. It was then that bearing load tests on material at the bottom of the cylinders were decided upon.

A 14-in. steel H-column with a 12-in. steel disk welded over the lower end was placed inside a cylinder that had been excavated and the top of the column was loaded by a hydraulic jack thrusting upward against the sides of the cylinder. With an upward reaction of 100 tons no movement of the cylinder was observed, showing that skin friction on the cylinder at this point was equal to at least 100 tons. The H-column went down 1.2 in. under a load of 60 tons per sq. ft. and 3 in. under a load of 100 tons per sq. ft. This test gave support to the belief that sufficient bearing could be obtained by driving longer cylinders.

The H-pile tests were satisfactory as far as they went but they left some doubts as to whether this was representative of the entire cylinder area or of other cylinders nearby. It was then decided to test several concreted cylinders with a load of 450 tons each.

Testing was done with the aid of one of the main girders for the pier. One of these girders was placed across the tops of three of the cylinders and the girder ends were strapped to the outer cylinders to take upward reactions while a 500-ton jack was applied between the under side of the girder at midspan and the top of the cylinder to be tested.

Preloading driven cylinders

Fully loading the cylinders gave such widely varying results, even in adjacent cylinders, that it was decided to preload every cylinder in the entire pier. Nothing less was considered satisfactory assurance of adequacy of the supports. Arrangements were therefore made to set up a group of four steel tanks on cylinders ready for preloading, filling each tank with water under carefully controlled and observed conditions.

The tanks used were 19 ft. 10 in. in diameter and 33½ ft. high and were operated in pairs. Each tank rested on a steel beam grillage which in turn was supported on a steel frame spanning two cylinders in the same bent and two cylinders in an adjacent bent.

The corners of the steel frame were centered on the cylinders and a jack was placed under each corner. Thus the jacks were at the corners of a 50x60-ft. rectangle. With this arrangement it was possible to allow for differential settlement between cylinders. Deflections were recorded as the tanks filled, and during the period the load remained on the cylinder, by means of a level rod attached to the cylinder shell and read by a level instrument.

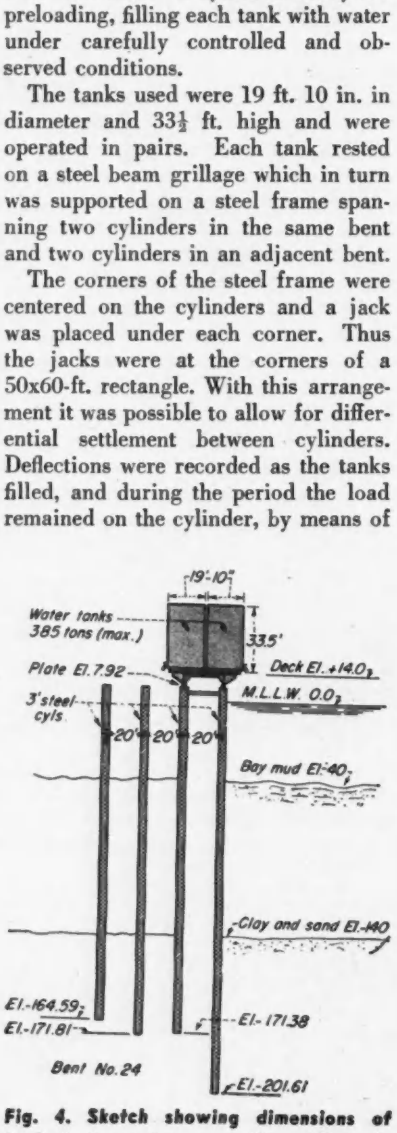


Fig. 4. Sketch showing dimensions of typical plan and cross-section with tanks in place on cylinders of maximum length.

Initial preloading plans proposed a cycle of 24 hr. for each cylinder. This would allow the load to remain on some 18 hr. However, adjacent cylinders in the same bent showed such unequal settlement that it was frequently necessary to stop, unload the tanks, and relevel the frame before resuming operations. Under the same loadings some cylinders settled 20 ft. more than those adjacent despite the fact that the driving records and the bottom elevations were approximately the same before preloading.

To reduce delays caused by the frequent unwaterings, jacks in which a 26-in. run-out of the ram could be utilized, were placed under the four corners of the frame. Endeavor was made to safeguard against the hazard of pressure failure in the hydraulic jacks by using shims, which were placed around the ram of each jack on each long run-out.

Even with the long run-out on the jacks the number of cycles on a single cylinder was as many as eight in some cases. Maximum settlements of 25 ft. were obtained. Correspondingly, cylinders were lengthened by as much as 25 ft. Maximum cylinder length was 209 ft.

Rapid action necessary

These conditions produced a hazardous situation. To keep the tanks safely balanced the contractor decided to avoid more than a 9-in. difference in elevation of adjacent tanks. When quick settlement of the cylinders was caused by the water loads, much time was lost in unwatering to stop the settlement until corresponding progress could be made in adjacent cylinders. The hazard is made apparent by the fact that settlement was sometimes as high as 8 in. in 30 sec.

Under these conditions there was need for quick action over the telephones connecting control points so that the instant there was risk of exceeding the permissible difference in levels, the water load could be quickly reduced by releasing water through a 14-in. valve placed at the bottom of each tank for this purpose. Settlement of the cylinder usually could be stopped by decreasing water depth in the tank about 2 ft. The valve was large enough to entirely empty the tank in about 12 min.

ESSENTIAL PENETRATION DATA ON 108 THREE-FOOT CYLINDERS

(Depths given below mean lower low water. Water about 40 ft. deep.)

Bent No.	DRIVING RECORD: Number of blows by 7,500-lb. ram in last foot — Cylinders A	B	C	D	DRIVING RECORD: Depth reached by driving (feet) — Cylinders A	B	C	D	SKIN FRICTION RECORD (during preloading test): Loading at which non-elastic movement started (tons) — Cylinders A	B	C	D	Ultimate depth 350 to 385 ton load (feet) — Cylinders A	B	C	D
1	210	162	194	144	146.4	147.1	139.1	145.0	184	350	350	272	146.9	147.3	139.1	145.3
2	249	184	165	168	138.8	142.2	141.6	142.4	262	203	350	282	139.8	143.1	141.6	142.6
3	207	252	230	174	146.9	145.3	144.2	140.7	223	174	243	252	148.0	149.7	144.3	141.1
4	264	182	240	296	145.7	143.9	144.0	147.1	174	174	302	292	146.4	146.0	145.0	149.0
5	203	221	255	172	143.7	143.9	145.7	144.4	223	223	272	272	144.3	145.2	146.7	144.8
6	190	195	197	204	146.4	147.9	145.9	144.8	174	174	243	253	150.0	151.3	148.0	146.5
7	201	198	197	175	153.0	145.1	145.3	146.3	154	223	223	223	153.0	146.2	145.6	148.4
8	450	199	200	199	149.4	147.1	146.2	146.3	223	223	174	174	152.6	148.4	147.4	147.1
9	207	260	236	232	148.4	156.0	153.0	154.9	174	174	223	223	160.5	160.4	156.9	155.9
10	89	104	87	144	146.8	146.7	146.9	156.6	223	253	174	174	152.9	148.0	147.0	163.4
11	242	232	216	218	150.9	159.5	153.4	151.5	253	243	223	223	157.4	163.3	163.4	160.0
12	238	240	256	236	153.3	157.5	156.1	151.2	223	223	174	174	160.4	164.1	163.8	159.8
13	213	204	228	194	151.9	149.6	150.6	145.9	174	174	125	125	153.1	150.6	162.6	147.5
14	201	201	204	200	154.8	148.8	150.7	147.6	223	223	174	174	163.6	150.2	151.6	148.2
15	236	244	280	324	149.4	148.0	147.7	147.0	223	223	223	174	150.0	148.4	148.6	147.7
16	206	244	276	198	152.9	150.9	150.3	146.8	272	274	213	213	153.7	151.6	150.7	147.4
17	228	295	412	204	158.3	157.5	159.2	152.9	272	272	174	174	159.8	160.1	159.2	155.6
18	226	248	208	238	155.9	157.9	153.9	154.9	174	174	223	223	175.0	172.6	162.2	161.1
19	199	225	200	220	174.5	174.5	160.1	164.8	223	272	282	306	176.7	177.0	169.1	166.3
20	206	215	205	210	169.4	162.6	171.6	165.8	174	174	125	174	172.9	185.7	172.0	189.7
21	215	215	226	245	173.2	175.7	174.1	171.1	223	223	223	302	173.6	175.6	183.2	173.5
22	300	290	200	450	175.0	173.8	172.9	172.1	272	272	223	223	175.1	173.8	173.1	173.1
23	210	210	223	204	170.1	163.1	175.0	168.2	233	233	174	174	175.5	174.7	175.7	172.9
24	240	225	204	240	176.7	161.1	168.9	164.3	223	223	243	243	201.6	171.4	171.8	164.6
25	294	345	259	235	173.1	172.2	168.6	173.9	223	223	223	223	174.9	173.3	173.2	174.3
26	266	230	230	210	172.3	169.8	175.0	172.1	223	223	223	223	173.4	171.7	175.0	172.4
27	276	220	228	218	175.6	168.2	174.6	167.7	312	223	300	223	175.9	171.0	174.9	172.3

To save time that would have been required for adding concrete filling in the cylinders after some of the rapid settlements, precast concrete cylinders 4 ft. long and 30 in. in diameter were placed inside the steel cylinders. These were handled by derrick, attaching the hook to reinforcing steel conveniently exposed by a recess in the top of the concrete. To prevent any tendency to buckle, each concrete filler, as it was put in place, was wedged tightly against the cylinder walls with wood wedges. Sometimes filling of this sort to total depths of about 20 ft. was used. In all cases the fillers were removed and the steel cylinder was filled with monolithic concrete before the job was finished.

When the preloading operations started, capacity load in the tanks was about 20 tons less than the amount later used. The additional weight, for which provision was made by raising the water tank walls, was desired to speed settlement in final stages on slow-moving cylinders.

Under 365-ton loading a cylinder sometimes continued to settle slowly for relatively long periods. By increasing the load to 385 tons more rapid progress was made for a time. When the rate again slowed, the 20-ton overload was removed and if movement then stopped the cylinder was considered to be in place. If not, the overload cycle was repeated.

The accompanying table gives a record of the driving and preloading of each of the 108 steel cylinders. Taking Cylinder B in Bent 20 as an example, it is seen that 215 blows of the pile-driver were struck in the last foot of driving, which left the cylinder at a depth of 162.6 ft. Yet when it was preloaded, it started non-elastic movement at a load of 174 tons and, after the full load of 385 tons had been applied, movement stopped when a depth of 185.7 ft. had been reached.

Because of the wide discrepancy in the way cylinders reacted to driving and preloading, even in adjacent bents, it seemed almost impossible to convey an idea of "typical" results with data on a few cylinders. Accordingly space is given to essential driving and preloading figures on all of the 108 cylinders. This makes available for reference purposes, full comparative data.

Although $\frac{1}{16}$ in. per blow for the last foot of driving would mean only 192 blows per foot, there was so much uncertainly resulting from irregularity in the formation that cylinders were rarely left with this penetration limit. Experience with the driving, notably inspection by divers after long pounding with the driving rig, gave assurance that prolonged driving caused no deformation of the cylinder. Cylinder lengths were estimated as closely as possible and then were driven down as far as they would go. Rarely was the driving stopped at 192 blows in the last foot. As the table shows, the average was much higher; 450 in the extreme case. This program gave maximum assurance that the cylinders were put down as far as possible and that none were resting on thin layers of hard material.

The wharf was constructed under supervision of the Bureau of Yards & Docks, U. S. Navy, according to designs prepared by F. R. Harris, Inc., and L. H. Nishkian, consulting engineers, San Francisco. Original soil exploration tests were made by Dames & Moore, San Francisco, and the contract for construction was carried out by the Pacific Bridge Co.

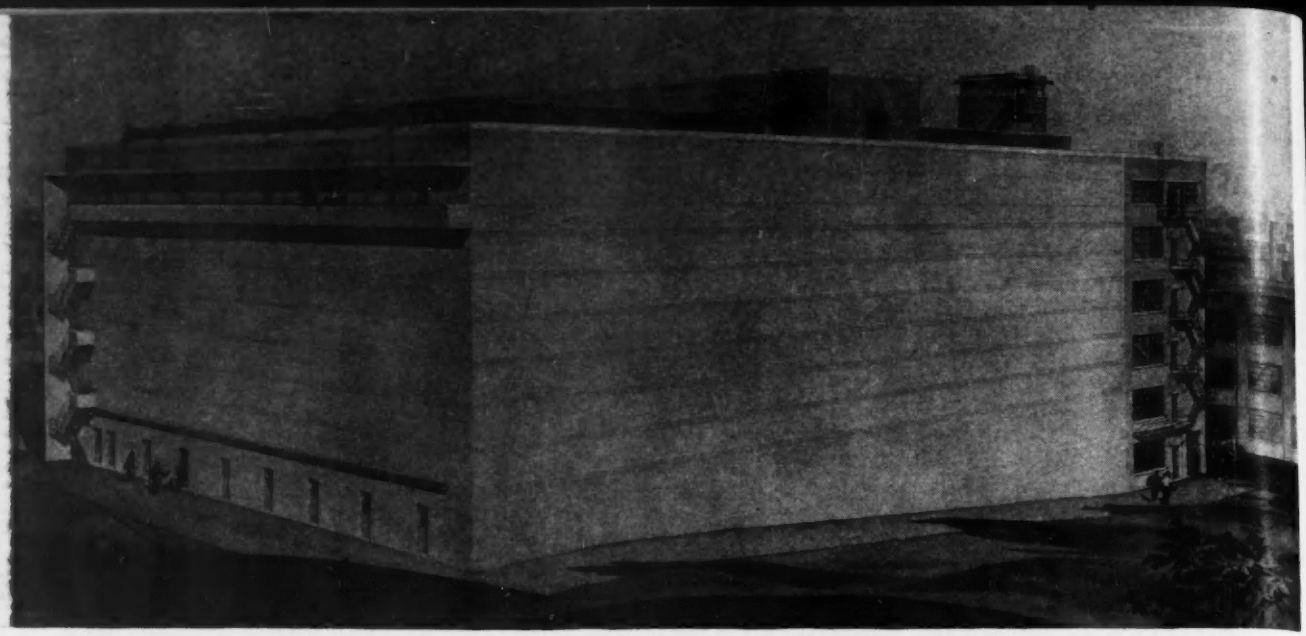


Fig. 1. Windowless concrete exterior of the Congoleum-Nairn plant encloses nine 59-ft. high ovens for curing linoleum.

High Concrete Walls Partition Building Into Curing Chambers for Linoleum

***Contents in Brief**—Erected for the curing of linoleum, a "stove" building recently completed consists of a series of huge, reinforced concrete ovens. The walls, 16 in. thick, 59 ft. high and 177 ft. long, forming the ovens, are tied transversely at the top by steel beams and at one end only in the topmost 18 ft. During construction, temporary ties were used to support the practically free-standing walls.*

CONSISTING of a series of huge, reinforced concrete ovens for curing linoleum and a six-story concrete attached section for facilitating distribution, a "stove" building recently constructed at Kearny, N. J., for Congoleum-Nairn, Inc., at a cost of about $800,000, posed some tough problems for both the designers and the constructors. To allow for deformation due to temperature changes, the thin, high concrete walls forming the ovens are tied transversely only at the top and at one end only in the upper 18 ft. Since they were practically free-standing during construction, special ties had to be used.

The stove building, 132 ft. 5 in. wide and 214 ft. 8 in. long, is essentially two structures (Fig. 1). About 35 ft. at the west end is devoted to a six-story, 72-ft. high section of reinforced concrete beam-and-slab construction, with brick facing and metal sash. Since its principal function is to facilitate movement of linoleum to and from the 179-ft. oven building, which is attached on its east side, the structure is built downhill from the stoves to take advantage of a sharp grade for additional space.

Built into grade at the second floor level of the multi-story section is the stove building proper. Architecturally, the windowless exterior of this structure depends almost entirely upon concrete form treatment for satisfactory appearance. Alternate smooth and recessed horizontal bands simulate the floor levels.

High walls form ovens

The exterior concrete walls are 18 in. thick, designed to withstand wind loads during construction and operation, as well as the full weight of materials and equipment. The north and south exterior walls, as well as the interior walls, are tied together by roof beams, which are spaced 8 ft. on center and anchored with two ¾-in. bolts in the top of each wall. The eight reinforced concrete interior walls forming the ovens are 16 in. thick, 59 ft. high and 177 ft. long and spaced 14 ft. 6 in. on center, extending the full depth of the building (Fig. 3). They are reinforced vertically by ½-in. dia. bars at 15 in. c. to c., with ⅜-in. horizontal bars 2.5 ft. on centers.

Independent of each other, each of the nine ovens has its own electrical controls, circulating system fans, recording instruments and separate monitor opening at the top. A penthouse running across the center of the roof above the stoves (Fig. 2) houses all ventilating equipment except the unit heaters for supplying outside air during the curing cycle. Inspection doors are provided at both ends of each stove. Each has an exit door at the top floor level opening onto a balcony, which extends the full length of the building. A cantilever-type balcony at the rear is connected by a canopy-protected stairway to grade.

In the ovens, seasoning or curing of linoleum—an oxidation process—is achieved at a constant temperature in excess of 150 deg. F. Since while this temperature is being maintained in

the stoves, a thermometer outdoors may read zero or lower, provision was made for expansion joints in the exterior walls (Fig. 4). Because of the fairly uniform interior heat, no similar provision had to be made in the inside dividing walls except where they connected with the exterior concrete.

In designing the outside walls, the wind load was taken at 15 lb. per sq. ft. and the temperature inside the building was assumed to reach a maximum of 185 deg. F. Two temperature conditions were investigated:

First, was uniform temperature increase throughout the exterior walls of from 60 deg. F. (the temperature during construction) to 185 deg. F. (the temperature during operation), from which the spacing of ⅜-in. wide expansion joints in the outside walls was computed. Second—and more unfavorable for the stress distribution in the outside walls—was the unequal temperature distribution resulting from zero outside and the operating temperature in excess of 150 deg. inside.

If the walls were not tied together at the top, this temperature differential would result in the curling outward of the walls, the outside face contracting and the inside face elongating. This curling action is prevented in the north and south walls by means of the steel roof beams, which introduce considerable stresses in the walls, and in the east wall by the interior 16-in. partitions, the top portions of which are cast monolithically with the top of the east wall (Fig. 6).

Walls braced during construction

The interior walls are provided with expansion joints that separate them from the lower portion of the east wall, and with two contraction joints located at the quarter points. The expansion joints between the interior walls and the end wall were introduced to prevent the expanding intermediate walls from pushing the east wall outward at the bottom. This would have resulted in stresses which could not have been taken by the wall. A considerable amount of detailed investigation also was necessary to determine the influence of shrinkage and the effect of expansion of the "stove" building on the adjacent six-story portion of the structure.

The practically free-standing walls, 16 in. thick and 50 ft. high, without external bracing except at one end and at the top required construction unusual in the building field. The walls rest on separate footings, carried to rock, with the floor slab bearing on the walls at about the ground line. Above this, the concrete was placed in lifts of a little less than 12 ft., using a single ring of forms 12 ft. high that were loosened and raised completely for each successive lift.

Stability of the walls, during construction and prior to tying them at the top with the permanent roof framing, was questioned due to the unsupported height and length. To eliminate possibility of wind damage, temporary wood bents were used at quarter points along the wall, extending from near the floor to the top, as shown in Fig. 5 (left). The frames were of heavy timber, diagonally braced and held by the bolts used for scaffold support braces.

At 36 ft. above the floor, a series of 1-in. and 1¼-in. square rods were laid diagonally across the walls and concreted in. Hooked at the ends around the vertical reinforcement, the rods were spliced by merely lapping through

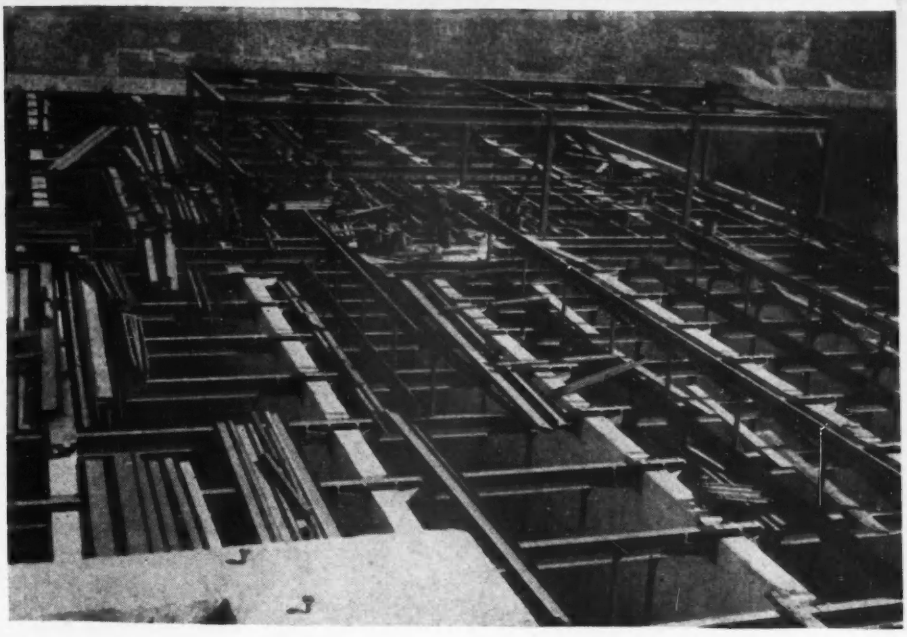


Fig. 2. Steel beams tie oven walls transversely at the top. Almost all ventilating equipment for supplying air for curing will be located in the penthouse.

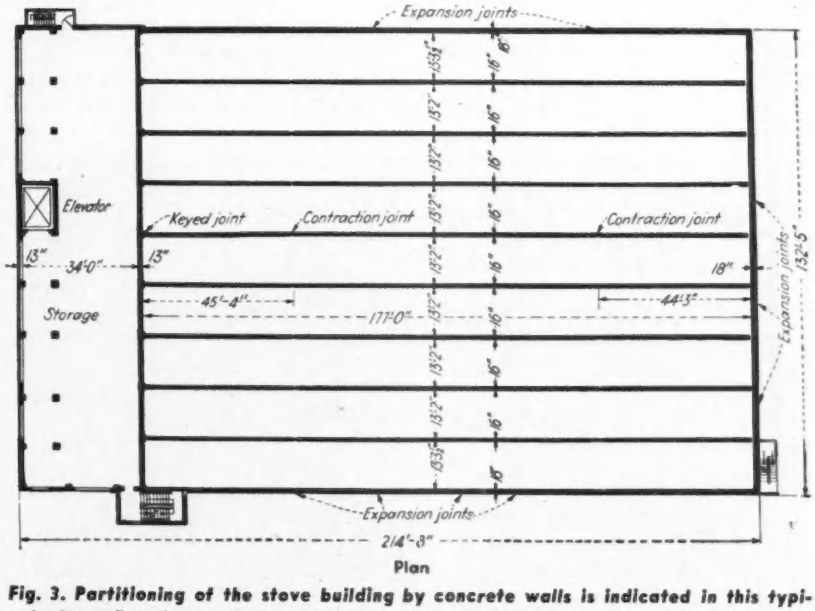


Fig. 3. Partitioning of the stove building by concrete walls is indicated in this typical plan. Exterior walls have been provided with expansion joints; interior walls have only one, separating them in part from the end wall.

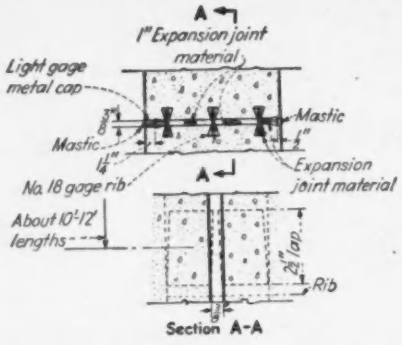


Fig. 4. Expansion joints in outside walls provide for the extreme range of difference between atmospheric and internal curing temperatures.

the interior walls. After the roof structure was in place to hold the walls at the top, the rods were burned off.

Formed from alternate bays

Scaffolding was used only in alternate oven areas. Those bays not having scaffolds were largely left open and formed much as outside walls by working from the scaffold in the adjacent bay (Fig. 5).

Forms for concrete were ⅝-in. plywood with 2x4 studs at 16 in. centers and double 2x4 wales 2 ft. apart. The forms for the exterior walls and for the interior walls (treated as outside) were made in 8-ft. long by 12-ft. high panels with wales permanently attached. These forms were set up first and the top braced with a 2x6 diagonal strut to the bottom of the form for the adjacent wall, following which the reinforcing steel was placed.

The form for the scaffold side of the wall was made up in 4-ft. wide panels for easy handling. Loose, double 2x4 wales were used in long lengths on this side of the wall to assure alignment. The forms were held by 5,000-lb. snapties with slotted-wedge fasteners, placed at 2-ft. centers, both horizontally and vertically, through holes bored in the plywood while the forms were being fabricated.

Concrete used had a minimum of five bags of cement per cubic yard and a strength requirement of 2,500 psi. at 28 days. A high early-strength admixture was used in the concrete and with concrete placed at 60 deg. F. and above, strength averaged about 2,000 psi. in five days. However, if concrete was not fairly warm when placed the admixture seemed to retard rather than speed the setting.

Concrete was delivered in transit-mix trucks, but water was not added until the mixer reached the job. At the site an adequate supply of 110-psi. steam was available, and this was piped into a 1,000-gal. tank for use in heating mixing water, an arrangement that made it possible to supply almost any necessary quantity of water at nearly 200 deg. F.

Stripping of the forms was started in about three days with removal of the slotted wedge castings that held the ties. Wales on the "inside" form of the interior walls were removed and laid on the work scaffold, then the 4x12-ft. panels were laid down. A new scaffold was placed at the top of the lift previously poured to facilitate working at the new level. Meanwhile, the "outside" form had been loosened, its top tilted back and held by a wire, while a timber bracket for a scaffold was bolted on at the new position, a few inches below the top of the concrete just placed.

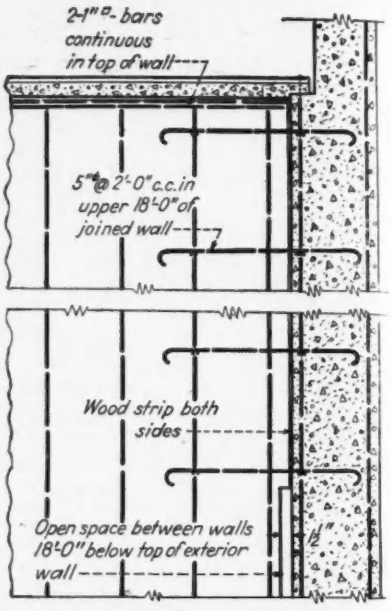
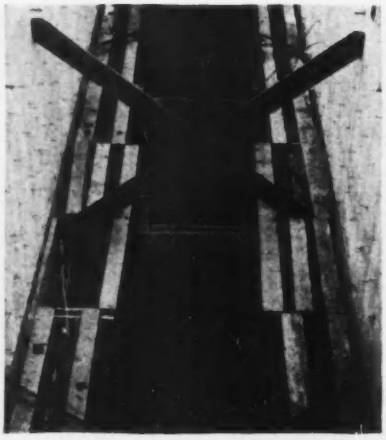

2-1" ø bars continuous in top of wall
5" @ 2'-0" c.c. in upper 18'-0" of joined wall
Wood strip both sides
Open space between walls 18'-0" below top of exterior wall
½"

Fig. 6. The east wall is tied at the top, where it is cast monolithically with interior walls, which are prevented by expansion joints from stressing the exterior wall near its base.

An A-frame, set on the top of the 16-in. wall with its top tied back to the adjacent wall, and a hand-winch were used to lift the 8x12-ft. outside form with wales to its new position. After raising, the top of each 8-ft. wide section was held by a single 2x6-strut. The inside form panels were lifted manually after the reinforcing was in place.

The stove building is one of two new structures just added to the Congoleum-Nairn plant at Kearny, N. J., the other being an examining building, a 2-story and tunnel, 185x248-ft. steel and brick structure, with limestone trim and steel sash on the exterior. Floors are concrete with certain areas hardened.

Both structures were designed by Albert Kahn Associated Architects & Engineers, Inc., of Detroit, Mich., for whom Alfred Zweig was in charge of design. Construction was performed by Turner Construction Co. under immediate supervision of L. E. Gilmore, construction superintendent, assisted by J. E. Smith. On field construction, the Kahn organization was represented by W. G. Carr.



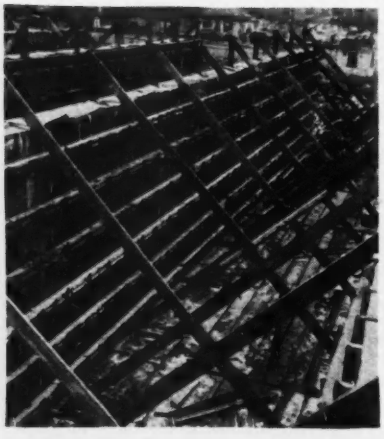


Fig. 5. Tie rods in horizontal planes and timber bents in vertical planes stabilized the walls during construction. Scaffolds at right were used only in alternate bays.

Graphical Calculation of Backwater Eliminates Solution by Trial

Francis F. Escoffier
Associate Engineer, U. S. Engineer Office, Mobile, Ala.

Direct calculation of backwater elevations without the use of trials or successive approximations is made possible by a graphical method developed in connection with recent hydraulic studies on streams in the southeastern United States. Not only is the method a simple and rapid one, but it can be adapted to most of the formulas for flow in open channels. In explaining the method, however, use will be made of Manning's formula as being the one most widely used by hydraulic engineers.

The Manning formula, as usually written, is

$$v = \frac{1.486}{n} r^{2/3} s^{1/2}$$

It can also be expressed in the form

$$Q = \frac{1.486}{n} a r^{2/3} \left(\frac{H}{L}\right)^{1/2} \qquad (1)$$

Where Q represents the discharge in cfs.; n, Manning's roughness coefficient; a, the cross-sectional area of flow in sq. ft.; r, the hydraulic radius in ft.; H, the fall in water surface elevation for the reach in ft.; and L is the length of the reach in ft.

Solving formula (1) for H gives

$$H = L\left(\frac{Q n}{1.486\, a r^{2/3}}\right)^2$$

$$\text{or} \quad H = P L Q^2 \qquad (2)$$

$$\text{where} \quad P = \left(\frac{u}{1.486\, a r^{2/3}}\right)^2 \qquad (3)$$

Where the length of the reach is appreciable, the value of P will vary, and for that reason it is convenient to use the average of its values at the two extremeties of the reach. We thus have

$$H = \frac{1}{2}(P_l + P_u) L Q^2 \qquad (4)$$

The two quantities P_l and P_u are functions of the water surface elevations at the lower and upper ends, respectively, of the reach. These can be plotted as abscissas on opposite sides of the same ordinate as shown on Fig. 1, the variable measured along the ordinate being the water surface elevation.

A simple graphical operation solves Eq. (4) without the use of trials. Point A on the left-hand curve is determined by the known elevation at the lower end of the reach. A line through A having a slope equal to $L Q^2/2$, where Q is the discharge for which the backwater is being calculated, will intersect the right-hand curve at B, thus determining the elevation at the upper end of the reach.

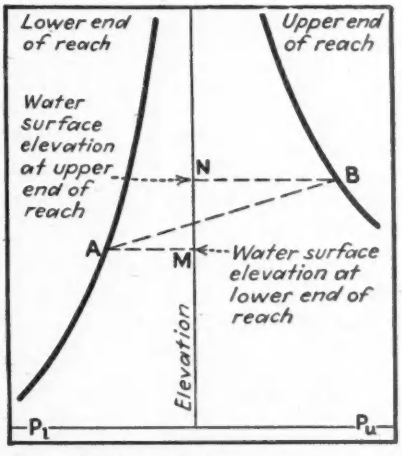


Fig. 1. Water elevation at upper end of reach is found by a simple graphical operation when discharge and hydraulic properties for which the backwater is being calculated are known.

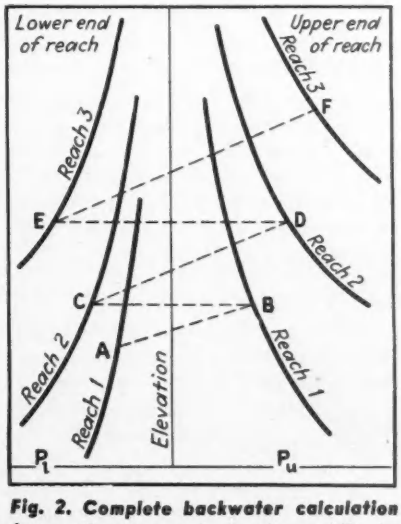


Fig. 2. Complete backwater calculation for a stream can be made rapidly by drawing the diagonal lines representing slope of water surface in the various reaches.

An inspection of Fig. 1 will show that AM $= P_l$, NB $= P_u$, MN $= H$, and that therefore the slope of the line AB is

$$\frac{MN}{AM + NB} = \frac{H}{P_l + P_u}$$

However, the slope of AB is equal, by construction, to $\frac{L Q^2}{2}$ and therefore

$$\frac{L Q^2}{2} = \frac{H}{P_l + P_u}$$

which is readily transformed into Eq. (4)

When a number of successive reaches are involved, the curves can conveniently be arranged as shown in Fig. 2. A complete backwater calculation is them made in a few minutes by drawing the sloping lines AB, CD and EF joined by horizontal lines as shown.

Pennsylvania Units Get $17,000,000 Motor Taxes

Cities, boroughs, towns and first-class townships in Pennsylvania have received the first quarterly payment from the $17,000,000 appropriation of motor vehicle license funds for 1946-1947 as provided by recent legislation in that state. (*ENR* Feb. 14, vol. p. 262).

In preparation for this disbursement, the department of highways has completed the task of compiling the total street and road mileage of all the municipalities of the state. This work was carried on under the supervision of the township bureau with the assistance of field representatives in the department's 11 districts. In order to make an impartial distribution of these funds, each report filed by the municipalities had to be checked in the field.

The final summary showed a total of 12,627 miles. This will mean $336.56 per mile to 1,045 units of government for 1946.

The 1,517 second-class townships of the commonwealth have been receiving a substantial appropriation for many years. The mileage for approximately 400 of these was revised in 1945 to bring the total mileage for all second-class townships to 45,433, which will provide an allocation of $93.54 per mile for 1946.

Multiple-Span Suspension Bridge t

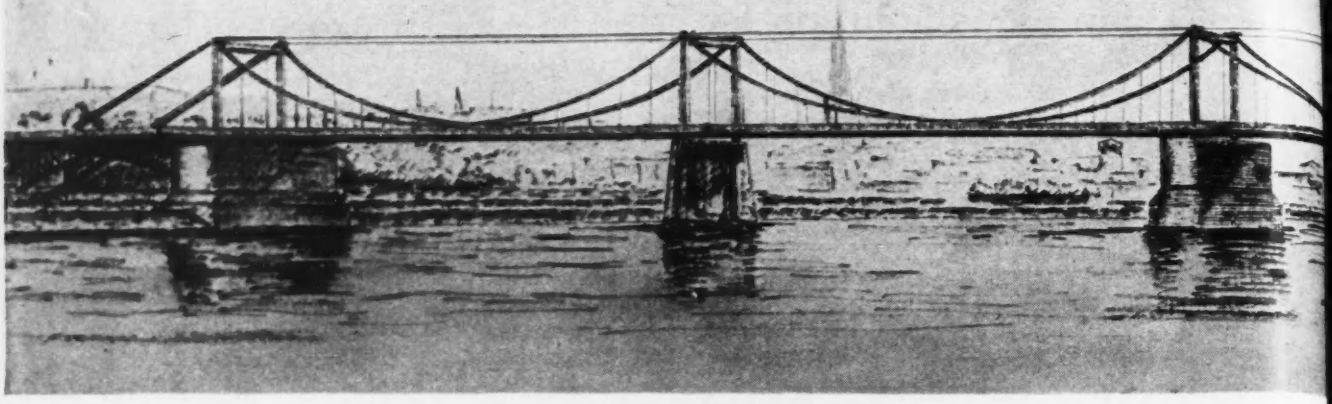


Fig. 1. New Rhine crossing at Dusseldorf will be a four-span suspension bridge, to replace two arch

***Contents in Brief**—Although seldom used, multiple-span suspension bridges are practical and efficient when horizontal tie cables are used between the tower tops. Such a design makes possible the economic replacement of two wrecked 595-ft. steel arches over the Rhine at Dusseldorf, Germany, with four 312-ft. suspension spans. Foundation construction involves two anchorages and two new intermediate piers; the old arch foundations will serve as the other piers. The main cables are of locked coil type, while parallel wire construction, subject to lesser elongation, is used for the tie cables. The roadway is designed for future widening, when and if it is desired to replace this relatively light bridge with heavier construction, perhaps of the original arch design. The work is scheduled to start this spring.*

D. B. Steinman
Consulting Engineer
New York, N. Y.

TO RESTORE HIGHWAY and rail transportation, many European bridges demolished during the war urgently need replacement. With funds limited by the financial straits of the local governments, this work of reconstruction calls for the highest resourcefulness and ingenuity in economical design and erection. One of the first plans officially approved for replacing the well known arch bridge over the Rhine at Dusseldorf by a multiple span suspension design with tie cables is a good example of the use of ingenious expedients to meet these existing limitations.

The fine old arch bridge over the Rhine at Dusseldorf (Fig. 2), built 1896–98, had two central through-arch spans of 595 ft. each, flanked by three deck-arch spans of 208, 186 and 166 ft. on the left bank in the city of Oberkassel and one deck-arch span of 195 ft. on the right, in Dusseldorf, making the total length 1,948 ft. All spans were two-hinged arches without ties. The trusses of the main arches were 16½ ft. deep at the crown and 40 ft. at the ends, the rise of the bottom chord being 97 ft. The bridge originally carried a 27-ft. roadway and two 7-ft. sidewalks, but was reconstructed in 1925–26, with the sidewalks and two rapid-transit tracks on outside brackets, leaving a 40-ft. roadway between the trusses for automobile traffic.

During the war, the two main arches were wrecked by demolition charges by the Germans, (Fig. 3) leaving the main piers standing and the deck-arch approach spans in place.

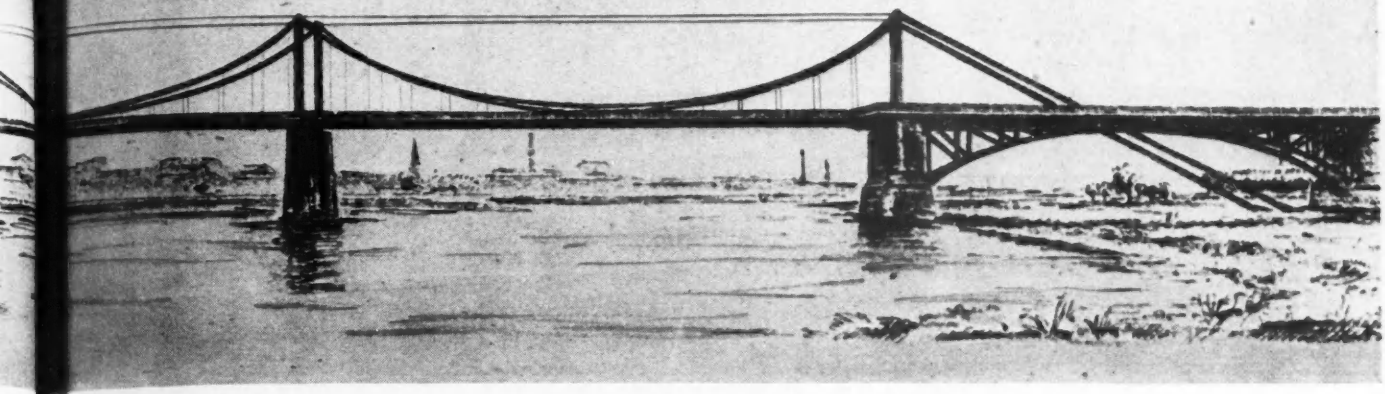
Spans half of former length

The proposed new structure (Fig.1) utilizes the three old main piers with the addition of two new intermediate piers, of lighter construction, to reduce the main spans to half-length. The two main arches of the original bridge are replaced by a multiple-span suspension bridge of four 312-ft. spans, with horizontal tie cables connecting the tops of the towers in each span. The light intermediate piers are to be carried on tubular piles. The five 90-ft. high towers are designed to rock t the base, to eliminate tower-bending stresses from the towers and the piers.

Very few multiple-span suspension bridges have been built because of the difficulty of demonstrating economy in extending the suspension principle to a plurality of main spans. The use of tie cables, however, yields a neat and efficient solution of the problem. In 1926 the writer hit upon this solution and applied for patent and soon thereafter, through a strange circumstance, the late Louis Russell Ash filed a similar application, only to learn that both had been anticipated in a French patent issued to Seguin in 1835 and in a British patent issued to Ordish in 1858. Apparently the idea was not recorded in technical literature and was lost to the profession.

American engineers later learned (*Engineering News-Record*, Jan. 28, 1932, vol. p. 143) that some old bridges of this type had been built over the Loire at Tours, including the Pont Suspendu de St. Symphorien built in 1847 and the Pont Bonaparte (date unknown), and that several new suspension bridges of this type were built by M. G. Leinekugel Le Cocq in the years 1927–30, including the Pont d'Ondes over the Garonne (three spans: 275, 272, 149 ft.), the Pont de Saint-Jean de Blaignac over the Gi-

to eplace Rhine Arches at Dusseldorf



arch spans wrecked by the Germans. Two new piers as well as the old arch supports are utilized.

ronde (three spans of 174 ft.), and the Pont de Montjean over the Loire (four main spans of 300 ft. each and two side spans of 163 ft.). An article discussing the possibilities and advantages of multiple-span suspension bridges with tie cables, was published in *Engineering News-Record*, Jan. 15, 1931, vol. p. 102, and an analysis of bridges of this type was presented in 1934 by the writer in "A Generalized Deflection Theory for Suspension Bridges" (*Transactions*, ASCE, 1935). A design with tie cables was studied for the Transbay Bridge at San Francisco, but the arrangement with center anchorage was selected as a preferred solution for that crossing.

This example of the rediscovery of an old invention is cited to emphasize the need for historical continuity in the progress of our profession. There have been other instances of the rediscovery of useful ideas that had been lost, or that were known in other parts of the world, illustrating the retarding of progress by lack of historical record of the art and by inadequate interchange of knowledge with engineers in other countries.

Multiple-span layout difficulties

The loss of economy in multiple-span construction (without tie cables) arises from the following condition: When the spans are unequally loaded, for example with live load covering one span and the other spans unloaded, there is a deflection of the towers toward the loaded span as a result of the unbalanced tensions in the respective supporting cables. This movement of the tops of the towers has the effect of lowering the cable in the loaded span, thereby throwing an undue proportion of the load upon stiffening trusses in that span. As a consequence, the stiffening trusses have to be much more heavily designed. The inherent economy of the suspension type, which is dependent upon the cable sustaining nearly all of the load, is thereby lost.

The fundamental economy of the suspension type cannot be retained unless the ends of the cable in each span are effectively held against any movement of substantial amount towardt the center of that span. Various solutions have been proposed, using rigid towers or braced towers, or making intermediate piers serve as anchorages for adjoining spans, but analysis shows that the use of tie cables offers the most efficient solution. With the provision of tie cables, light, flexible or rocker towers may be used, and the cables, anchorages, and stiffening trusses may be designed of practically the same sections and dimensions as for a single-span suspension bridge of the same individual span-length.

Design considerations and details

In the design for the Dusseldorf crossing, an unusually high ratio of three-fourths is used for the relative sections of tie cables and main cables. The main suspension cables will each be made up of eight patent locked-coil cables of 1.8-in. diameter, while six cables of the same diameter but of parallel-wire type will be used for the ties.

Using the highest grade of steel obtainable, the drawn steel wire for the main cables has a tensile strength of 215,000 to 255,000 psi., and the locked-coil construction yields a value of 24,000,000 for E, the strands being cut to length under initial tension. In the case of the tie cables, however, because their effectiveness depends primarily upon their resistance to elongation, the parallel-wire construction, with the higher value of over 29,000,000 for E,

Fig. 2. Dusseldorf bridge over the Rhine as it appeared before the Germans blew out the two main arch spans. Dusseldorf is at the left on the east bank of the river.

ENR Staff Photo

Fig. 3. Wreckage of Dusseldorf bridge as it appeared while the Germans still held the city in February, 1945. Picture taken from behind levee in Oberkassel.

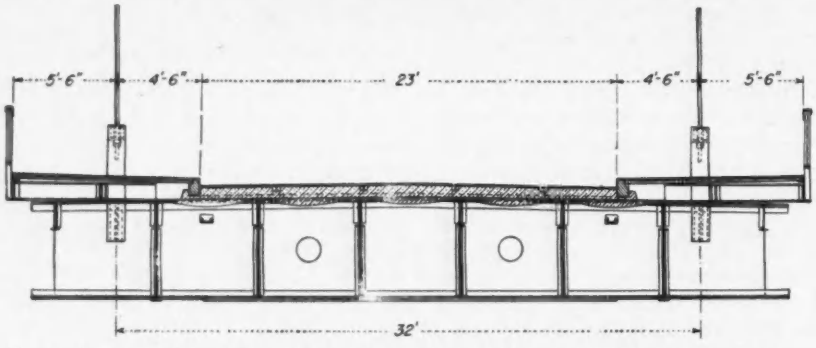


Fig. 4. Cross section of Dusseldorf bridge. Floorbeams are designed for extensions at ends to widen roadway at some future date when present four spans will give way to original two-span arrangement.

is used. High initial tension to prevent reversal of stress is unnecessary, because the tie cable is not expected to take compression. In usual design analysis, the tie cable is assumed nonfunctioning in the loaded span.

Heavy loads excluded

In view of the limited funds available, it is proposed to exclude the heavy express tramway cars and to restrict the loading to light standard type tramway cars. These will be accommodated on the 23-ft. vehicle roadway (Fig 4). The calculations were based on two tramway trains meeting on a given span, plus a sidewalk load of 30 lb. per sq. ft. with the remaining spans unloaded (the most severe assumption). For this assumed loading, the maximum calculated live load deflection in any span is 7.5 in., or 1/500 of the span. This deflection is considered permissible even for tramway cars passing over the bridge at higher speeds. Actual deflections are always less than calculated.

The effect of possible settlement of the piers and displacement of the anchorages was considered, although the suspension type is but little sensitive to accidental displacements of the supporting points. If the stiffening girders are discontinuous at the towers, even great subsidences of one or more piers will produce no appreciable stress increase in trusses or cables. Even if the stiffening girders are continuous over the piers, a pier settlement of 20 in. would produce a stress increase of only 1,400 psi. in girders of depth equal to 1/50 of the span. (In a continuous plate girder bridge, with the greater girder depth of 1/17 of the span, the effect would be three times as great.) In view of the emergency design with light auxiliary piers alternating with massive piers, these considerations favored the selection of the suspension type.

Provision for settlement

Yielding of the anchorages, reducing horizontal tension and increasing cable sag, would produce additional bending moments in the stiffening girders, but these moments would be small on account of the relatively shallow depth of the girders. Nevertheless such displacements are undesirable, and therefore the anchorage design is made sufficiently substantial to assure safety against displacement, utilizing the solidly founded piers of the old bridge. As an extra precaution, means for possible future adjustment are provided both at the anchorages and at the individual suspenders in order to be able to compensate even the smallest initial subsidences of the piers and abutments.

In the design of the anchorages, their net weight (after deducting buoyancy) was made 1.3 times the maximum vertical component of the cable pull. The greatest part of the horizontal component of the cable tension is to be taken up by the existing main piers. To this end, two reinforced concrete struts, each about 6 ft. high and 3 ft. wide, will be built between each anchorage and the adjacent main pier. In order to utilize the full sliding resistance of the anchorage also, it has been arranged to cast the concrete struts in place after the anchorages have taken part of the load including the dead weight of the structural steel and the initial tension of the tie cables.

The stiffening girders are welded plate girders. The floorbeams and stringers are standard rolled sections. The entire design is developed for ease and economy of maintenance.

Suspension type economical

The adoption of a suspension design as the economical solution for spans as short as 312 ft. is of interest, in view of the prevailing impression that the superior economy of the suspension type over other forms starts at span-lengths over 800 ft. The cost of a short suspension span is about 50 to 80 percent of a corresponding plate girder span. Offsetting this saving, in whole or in part, is the cost of the anchorages; but when this cost can be divided

over three or more main spans, as in the multiple-span design, the suspension form can compete with equivalent continuous plate girder designs at span lengths as short as 300 ft. or less.

Adopted design permits widening

The proposal and bid for this work included four alternates, for different loadings and for light and heavy roadway construction, three of them involving 1,335 to 1,460 (metric) tons of steel and ranging in cost from 758,600 to 866,280 Reichmarks (now equivalent to about $75,860 to $86,628). The fourth alternate (Tender C) was adopted, requiring a somewhat higher tonnage of steel but providing a roadway design that can later be extended to a 45 ft. width, perhaps on spans of the original arch type, when the auxiliary intermediate piers will be eliminated.

The design was developed and submitted by Carl M. Bohny, chief engineer of the Gutehoffnungshütte Oberhausen A.-G., one of the largest bridge fabricating and erecting organizations in Europe; and the proposal has been approved by the German authorities and by the British Military Government. Mr. Bohny was employed in the writer's bridge designing organization from 1927 to 1929, learning American bridge practice and the new developments in suspension bridge design, before he returned to Germany where he taught engineering at Danzig, published a book on suspension bridge design and construction (1934), and later succeeded his eminent father, Friederrich Bohny, as chief engineer of the Guttehoffnungshütte works at Sterkrade.

The construction has been planned and scheduled in consultation with Messrs. Holzmann and Frankipfahl, the substructure contractors for the proposed work.

The wreckage from the old bridge will first be cleared away, using the underwater equipment which the same contractors have developed and used for the similar removal of the bridge wreckage blocking the Rhine at Cologne and other places. Also used will be 750-ton gantry cranes, which Dr. Bohny built for the Cologne job; they run on steel girders erected above the bridge wreckage.

As soon as the central portion of the west opening is cleared, pile driving will start for the intermediate pier. Simultaneously with the work of the clearance gangs, construction of the anchorages on the west bank (the flood zone) will be started, in an attempt to get the anchorages done before interruption of the foundation work by high water. The work is scheduled to be started this spring estimating three or four months for the substructure work before the steel erection can proceed. If the completion of the anchorages is delayed, the cables will be temporarily secured to the steelwork of the existing approach spans in order that the superstructure erection may proceed on schedule.

Cost of Temporary War Housing Developed by FPHA

Total development costs and average costs per dwelling unit by major cost classifications for typical war-housing projects put under contract by the Federal Public Housing Authority during the year ended December 31, 1945 are given in the following table. All the projects are family dwellings of temporary construction and the data show costs at the time all units were substantially completed. Variations in project composition, such as the size of families to be accommodated; type of utilities and equipment installed; amount of furniture and furnishings provided; type of plan used and the number of commercial and other project facilities provided, affect the comparability of the individual project costs reported here.

Location of project	No. of dwelling units [1]	Total development cost	Average cost per dwelling unit: Total development	Dwelling facil.	Furn. and furnishing	Non-dwelling facil.	Site improvement	Site acquisition [6]	Arch., admin. and other [7]
California									
Barstow	44	$168,540	$3,830	$2,250	$343	$21	$745	$8	$193
Berkeley	56	196,880	3,516	2,164	341	29	241	575	166
Los Angeles	40	140,540	3,513	2,370	364	26	555	...	198
Oakland	56	231,260	4,130	2,223	440	256	693	250	268
Oakland	72	260,090	3,612	2,235	354	192	464	175	192
Oxnard	80*	217,570	2,719	1,726	320	39	488	...	146
San Diego	96*	276,100	2,876	1,677	307	25	727	6*	134
San Diego	240	752,320	3,135	2,020	316	114	470	98	117
San Diego	44	161,240	3,664	2,364	340	27	737	...	196
San Diego	40	151,050	3,776	2,345	320	28	640	240	203
S. S. Francisco	152*	470,560	3,096	1,807	313	136	644	71*	125
Stockton	36	141,160	3,921	2,285	296	215	701	227	197
Indiana									
Charlestown	650*	2,243,000	3,451	1,934	200	322	887	26	82
Oregon									
Astoria	10	39,050	3,905	2,706	300	5	477	26	391
Eugene	60*	169,460	2,824	1,828	228	210	397	3*	158
Klamath Falls	50*	146,050	2,921	1,820	70	255	520	73	183
Klamath Falls	155	564,290	3,640	2,275	235	22	904	56	148
Texas									
Amarillo	300*	832,830	2,776	1,776	199	274	418	32	77
Washington									
Ancortes-Whidbey Island	65	240,590	3,701	2,622	280	6	645	...	148
Forks	20	76,200	3,810	2,452	266	20	746	43	283
Seattle	100	384,410	3,844	2,395	290	24	886	124	125
Seattle	315	1,014,000	3,219	2,330	236	105	381	87	80
Shelton	20	76,908	3,845	2,443	378	261	545	...	218

[1] All units except portables or hutments, indicated by an asterisk (*), are based on the latest standard plans (WDU-15 or WA-25) specially designed for the Navy.

[2] Rounded figures; allowances for contingencies excluded.

[3] Cost of dwelling structures including plumbing, heating and electrical costs, and movable dwelling equipment such as ranges, refrigerators and portable space heaters.

[4] Cost of management and maintenance and other non-dwelling buildings, spaces and equipment.

[5] Cost of clearing and general grading, streets and walks, utility mains, including sewers, water, gas and electrical systems, landscaping and other costs of developing the site.

[6] Cost of land and land acquisition expenses or cost of leasehold during development where indicated by an asterisk (*).

[7] Includes amounts for architectural and engineering services, costs of inspection and supervision on project site, administrative costs of local housing authority directly traceable to the project (when developed by a local housing authority).

Deep Cutoff Trench of Puddled Clay For Earth Dam and Levee Protection

Hans Kramer
Brig. Gen. United States Army (Retired)
Consulting Engineer, Vicksburg, Miss.

***Contents in Brief**—Full-scale field test by U. S. Army Engineers demonstrates effectiveness of a new method of preventing both through-seepage and under-seepage in earth levees and dams by sealing a deep cutoff trench with clay slurry and backfilling it with puddled clay. No sloughing of the walls occurred during the simultaneous excavation, slurry-filling and backfilling of the trench, which was dug to a 35-ft. depth with trenching machine and dragline. Greater economy is envisioned through development of a trenching machine capable of excavating a 35-ft. deep trench.*

THE ART of constructing earth dams or levees, in simple but succinct language, consists of "keeping the water out but taking care of what gets by." For the engineer, such structures when built with relatively pervious material or on pervious foundations, as they frequently must be, are beset with two chronic ailments—through-seepage and under-seepage. The deep-trench puddled-clay cutoff described and discussed herein is not heralded as a panacea. But its prospects justify publicizing the current stage of progress since it indicates potentialities that should challenge the alertness and resourcefulness of the construction fraternity; *viz.*, engineers, contractors and equipment manufacturers. It is the purpose of this paper to stimulate that reaction.

In the case of levees along the lower Mississippi River and its tributaries, the saturated landside slope conditions, which are the manifestation of through-seepage in time of flood, are troublesome enough but less serious and less frequent than the "sandboils" at or near the landside toe which spring from under-seepage. On the basis of personal experience during the record flood of 1937 and other observations, it may be safely stated that the occurrence of sandboils constitutes serious

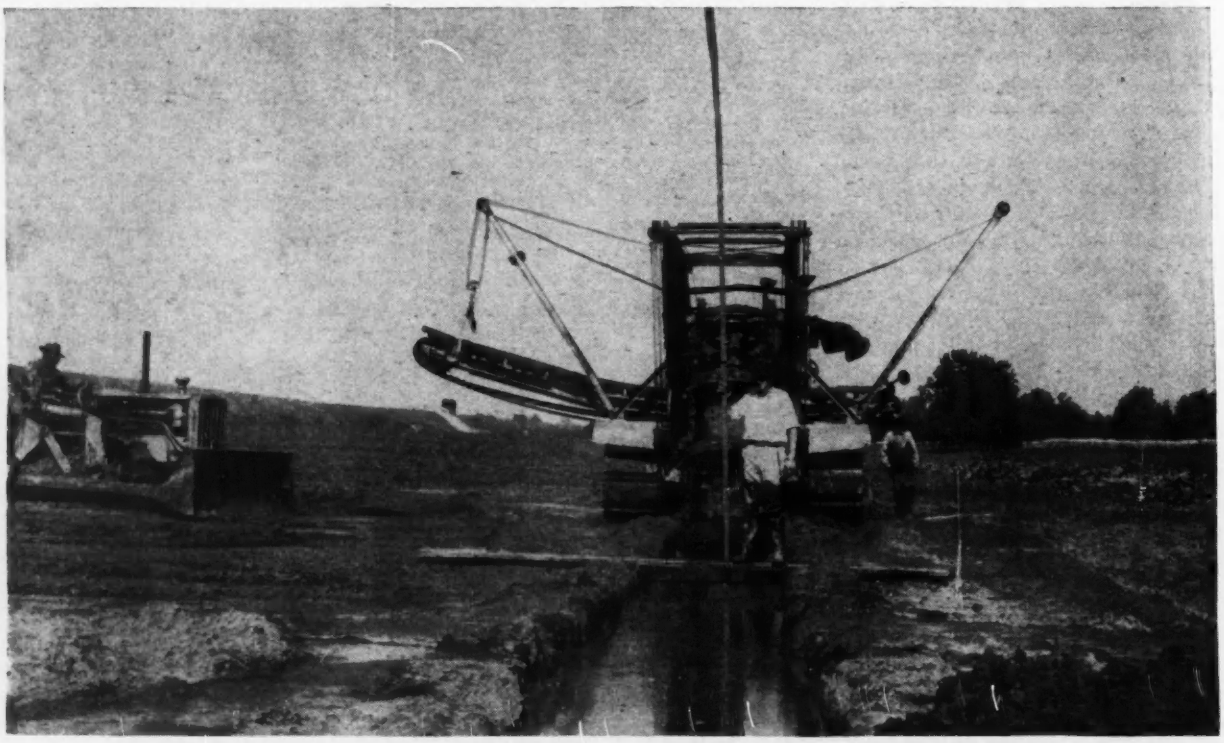


Fig. 1. Deep cutoff trench sealed with clay slurry and impervious backfill prevents under-seepage of earth levees.

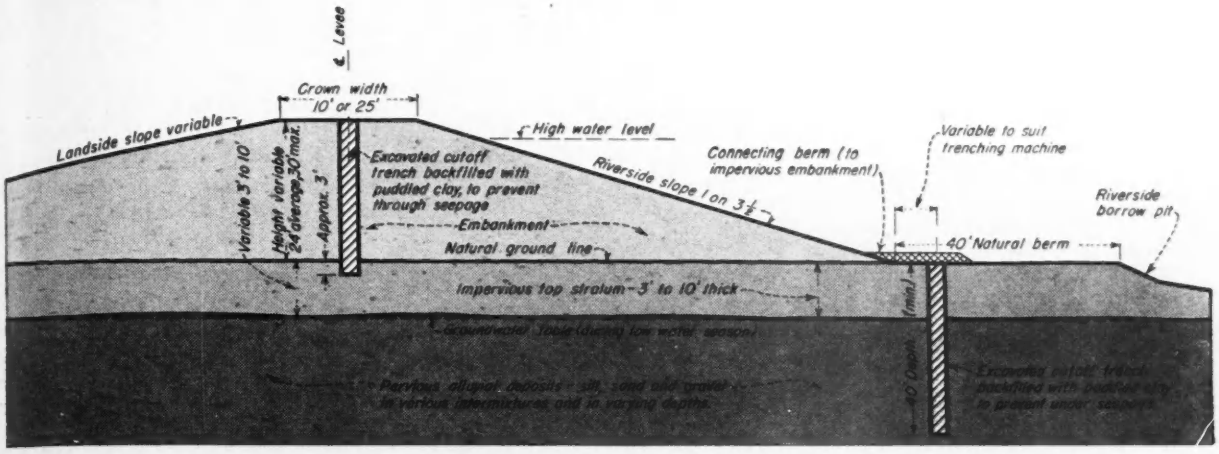

℄ Levee
Crown width 10' or 25'
Landside slope variable
Variable 3' to 10'
Height variable 24' diverge 30' max.
Approx. 3'
Excavated cutoff trench backfilled with puddled clay, to prevent through seepage
℄ High water level
Riverside slope 1 on 3½
Connecting berm (to impervious embankment)
Variable to suit trenching machine
Riverside borrow pit
Embankment
Natural ground line
40' Natural berm
Impervious top stratum - 3' to 10' thick
Groundwater table (during low water season)
Pervious alluvial deposits - silt, sand and gravel - in various intermixtures and to varying depths
40' (min.)
Excavated cutoff trench backfilled with puddled clay to prevent under seepage

Fig. 2. Seepage through the levee is prevented by a clay-puddle seal in the levee embankment, while under-seepage is reduced by a seal located near the toe of the levee on the river side.

trouble for the engineer in addition to being particularly worrisome to the lay community.

In the design and construction of earth structures, engineering treatment for through-seepage—which is in the nature of an acquired, but preventable, disease—consists of impervious blankets on the upstream slope or impervious, interior core walls as well as other practical applications of the science of soil mechanics in the selecting, zoning and compacting of embankment materials.

Engineering treatment for under-seepage—which is in the nature of an hereditary and unavoidable disease—is of two general types: (1) preventative, such as cutoff walls, grout curtains, upstream impervious blankets, etc.; and (2) palliative, such as drainage installations, seepage berms, sub-levee systems, etc.

Nothing better than a puddle trench

From the engineers viewpoint, according to Creager, Justin and Hinds in *Engineering for Dams*, "there is nothing better for a cutoff than a puddle trench refilled with genuine puddle." On the basis of that philosophy and authority, the unsolved problem of preventing or effectively reducing levee under-seepage has been attacked recently with the development of a new technique in the application of a well-established principle.

The resulting concept of adapting an impervious cutoff trench to existing levees is depicted schematically in Fig. 2. This illustration shows a typical levee cross-section and alluvial foundation conditions with an entrenched, impervious cutoff wall near the toe of slope to prevent under-seepage, and a core wall at the center of the levee to prevent through-seepage.

In concept, the new technique merely combines the efficient, continuous, narrow and deep operating characteristics of a conventional trench excavating machine with a puddle backfill, made from selected local materials and placed continuously as the excavation progresses, to attain an impervious cutoff wall.

The initial concept envisioned the use of a metal shield, integral and movable with the trench excavator, to brace the sides of the trench during the excavating and backfilling process, it being anticipated that deep, vertical trench walls excavated below the groundwater table in gravelly, sandy and sometimes silty materials would be unstable without external restraint. The design and employment of such a shield, though considered feasible, were recognized as involving difficult mechanical and operational problems.

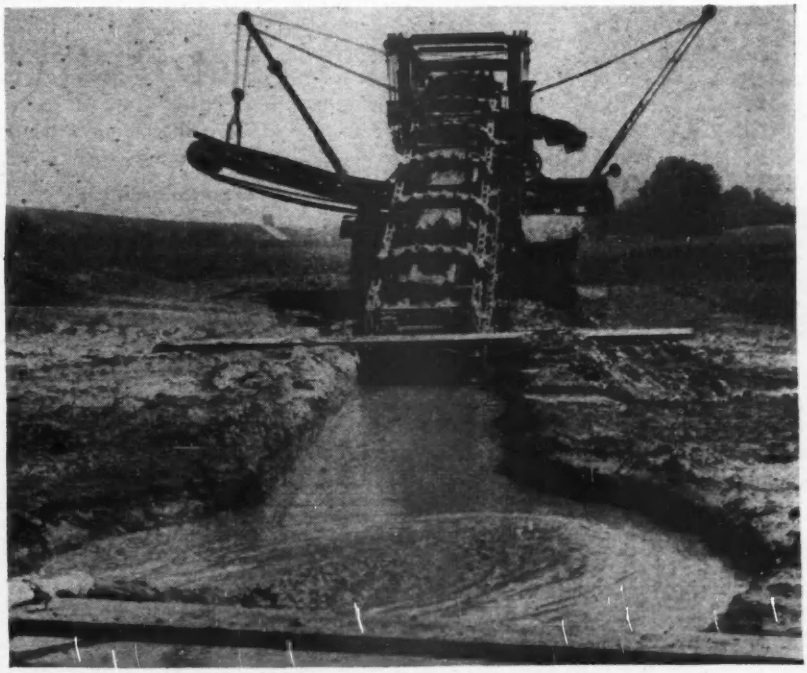


Fig. 3. Caving of the open trench occurred at a 9-ft. depth, as shown in the foreground. When pumped full of clay surry, the trench was deepened without sloughing.

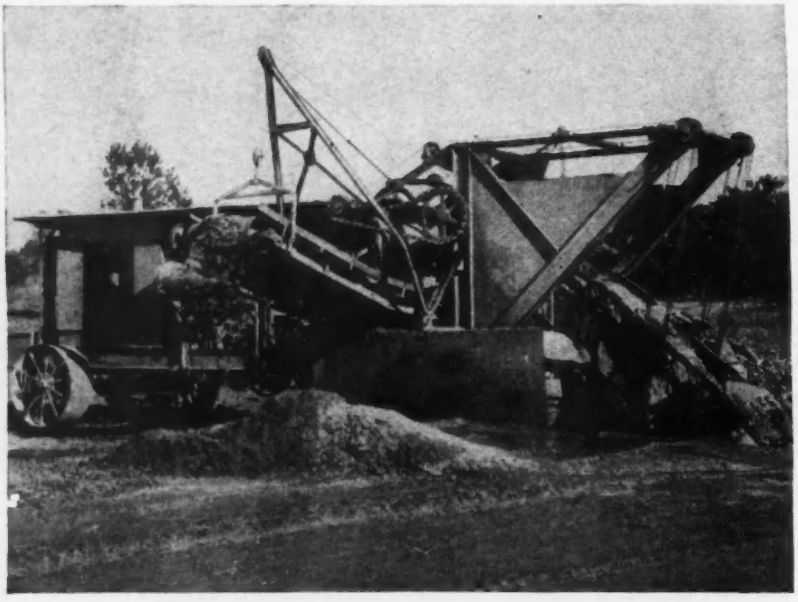


Fig. 4. Operating at full depth, a conventional-type trenching machine could excavate to a depth of only 20 ft. Metal shields protected the travelling mechanism. Experiments indicate the need for development of special equipment.

As an alternative or auxiliary means of creating the restraining effect of a shield, the possibilities of applying clay slurry, in a manner similar to its utilization in oil-well drilling operations, were given early consideration. Capt. J. W. Black, Jr., Corps of Engineers, U. S. Army, who directed the field experimental work, subsequently developed and demonstrated the practicability of using clay slurry. Contemplated also was the less difficult structural and mechanical modification of standard trenching machines, which are factory-built for a maximum excavation depth of 24 ft., to obtain depths in the range of 35 to 40 ft.

Practical field experiment

Field experimental work began in September, 1945, along a stretch of "mainstem" Mississippi River levee on the Arkansas side of the river just below Memphis. It was early in October, however, before mobilization was complete and actual trenching, using a conventional-type machine, was under way.

The site selected for the first field work was one where serious sand-boils had occurred during the record flood of 1937. The impervious blanket was shown by 13 inspection borings to vary from 0 to 4.5 ft. in thickness and to average about 1 ft. Groundwater was indicated to be about 15 ft. below the natural ground surface, and the impervious blanket had underlying it pervious material consisting of fine to coarse sand with some gravel up to ¾-in diameter.

At this juncture it is pertinent to observe that the field work was largely divorced from theoretical considerations; the men assigned to it were chosen primarily on the basis of their experience with practical construction problems, since it was felt that solution of the practical difficulties was of prime importance in the successful development of the basic idea.

Little equipment needed

Equipment assembled at the site for initial experiments included: One trenching machine capable of excavating a trench to a depth of 19 to 20 ft.; a bulldozer for handling backfill material, knocking down of spoil and general cleanup; one special mixing unit to make the clay slurry for trench wall retention; a 4-in. self-powered pump for circulation and distribution of slurry; one 4-in. self-powered water pump; a 20-hp. farm tractor for powering the slurry mixing unit, and one disk harrow for chopping impervious clay backfill material.

The slurry mixing unit was of special design and shop-made. It consisted of a wooden box 4 x 4 x 12 ft. fitted with twin paddle shafts running lengthwise of the box at about mid-depth. The shafts were rotated each in the same direction at 50 to 60 rpm. with reduction of the speed of the tractor pulley being secured by a system of roller chains and sprockets. The paddles were staggered at intervals along the shafts so that they overlapped and the end of each paddle swept within 1 in. of the adjacent shaft. The paddles also were fitted with feet which overlapped each other.

This unit worked in a satisfactory manner, but its use resulted in the conclusion that a production unit should have twice the capacity of the experimental unit. Water supply for mixing the slurry was obtained from a 6-in. well dug to a depth of 35 ft. at the site of the work, a fact, incidentally, which is a practical measure of the perviousness of the substrata.

Trench sealed with clay-slurry

The density of the clay slurry was approximately 8½ lb. per gallon throughout the experiments, density being controlled by visual observation rather than by refined measurements. It was essential to maintain sufficient clay content in the slurry to coat and seal the walls of the trench in order to make the hydrostatic pressure effective against them instead of being dissipated through the porous strata. That this objective was attained successfully was proved by the fact that loss of water in a slurry-filled trench amounted to only a few inches overnight.

The first trench was dug without effort to retain the walls in order to determine to what depth trench walls would stand unretained in the types of material which generally would be encountered. When the boom of the trenching machine reached a depth of 9 ft., the trench caved in on both sides and trapped the boom to such an extent it had to be dug out by hand.

After the boom was extricated, the trench was filled with clay slurry and digging resumed in the slurry-filled trench. This resulted in successful digging to the limits of which the trenching machine was capable (19 to 20 ft.) without the further caving of the trench walls. Ground-water level was at 10½-ft. depth.

When the machine was digging from the slurry-filled trench, the standard digging buckets with which it was equipped were found to be not well suited to operating in a fluid since, as

the boom reached deeper into the ground, the backs of the buckets on the lower side of the boom became so low that they spilled a greater part of their loads into the trench. This wet material, mostly sand, spilled from the buckets, bucket chains and conveyor belt, fouled the tracking mechanism and caused two breakdowns.

Metal skirts were rigged to protect the tracks and they proved effective.

The spill-back, however, provided another problem when it was observed that it became suspended temporarily in the slurry and, if allowed to stand without agitation for as much as one hour, would begin to settle on the bottom of the trench, reducing its effective depth of 20 ft. to about 8 ft. after 24 hours standing.

This, then, left two major problems insofar as the use of conventional type trenching equipment was concerned; *viz.*, (1) development of a machine capable of digging at depths of more than 20 ft., (2) elimination of the spill-back. Both are problems that are capable of solution, according to representatives of equipment manufacturers who collaborated with the Army in the first tests.

Backfill of impervious clay

Following the initial success of retaining the trench walls with clay slurry, a full operation of simultaneous excavation, slurry fill and backfilling with impervious clay was undertaken. The clay used for backfilling was located 400 ft. riverward of the experimental trench. It was hauled and stockpiled parallel to and a few feet riverward of the trench site, then pulverized with an ordinary farm disk harrow, which was loaded with several concrete weights to obtain sufficient weight for penetration. The pulverized material was shoved into a windrow immediately adjacent to the proposed cut. Excavation and filling with slurry was continued until a length of about 40 ft. of trench was available.

Backfill operations were started by dozing the windrowed material directly into the trench. The entire operation was satisfactory except for the spill-back previously described. The opinion prevailed, however, that a better job of pulverization was desirable and could easily be obtained by using a heavier tractor and disk. Further experiments on this phase confirmed that opinion.

This work, while revealing one major mechanical problem to be solved—that of spill-back—proved that the idea is practical from an operating standpoint at depths of 20 ft.—the limit of the conventional machine used in the tests. Whether equal satisfaction could be obtained at greater depths thus became a particularly pertinent question, since depths of at least 30 ft. are desired to attain an effective cutoff wall.

Excavated trench to 35-ft. depth

To answer this question it was decided to use a dragline for excavation purposes in an effort to get a deeper trench, while the work of designing a trenching machine capable of greater depths was under way.

The first excavation with the dragline was made with a 50-ft. boom and a 2-yd. bucket with dull teeth. The maximum depth obtainable was about 10 ft. at which depth the bucket skidded along the bottom without filling due to the short reach of the boom and the dull teeth. The boom then was extended to 100 ft. and a new 31-cu. ft. bucket, with holes near the top and back, was attached. It then was possible to dig a trench slightly deeper than 35 ft., with groundwater at 14-ft. depth, without sloughing of trench walls.

This experiment, which was not expected to develop efficiency of output in the digging operation, demonstrated conclusively that vertical trench walls supported by clay slurry would remain stable at a depth of 35 ft.

Merits and shortcomings

The merits and shortcomings, both theoretical and practical, of the mode of treatment whose genesis, evolution and prospective development have been described above deserve objective analysis. Most of the characteristics of the impervious cutoff trench speak for themselves; a few important aspects are admittedly still moot.

Obvious merits arise from the fact that the impervious cutoff trench is simple and rational in theory and in application. Furthermore, it is positive in its functioning, requires no foreign or alien materials, is not subject to rupture through settlement or deterioration and is foolproof, self-adjusting and self-healing.

Citing Creager, Justin and Hinds again: "Properly constructed, it [a puddle trench refilled with genuine puddle] is superior to concrete as a cutoff since the material itself is less pervious and also cracks through such puddle walls are practically unknown." Significant, too, particularly from the constructor's viewpoint, is the fact that it requires no new or special skills and that it involves no interference with normal construction operations.

The main shortcomings of the im-

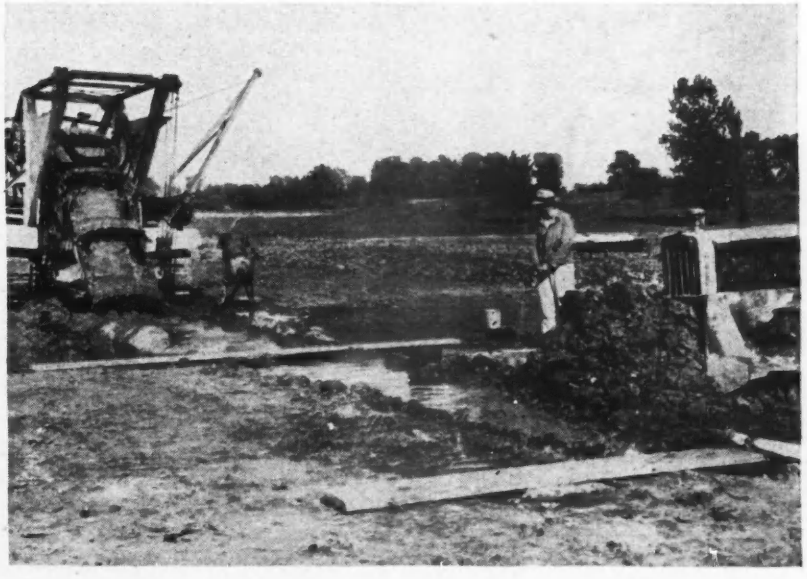


Fig. 5. Backfilling with impervious clay followed close behind the trenching machine. The trench was kept filled with clay slurry pumped through a 4-in. hose, shown at the extreme right.

pervious cutoff trench in its present state of development are twofold. First to be considered is an obvious practical limitation in attainable depth, which constitutes a corresponding imperfection in theoretical effectiveness. A full cutoff, *i.e.*, one extending to a continuous impervious stratum, is, of course, a desideratum.

In the Mississippi's alluvial valley, unfortunately, the depth of such (Tertiary) strata is generally measurable in hundreds of feet, which makes the construction of a full cutoff prohibitive. But that unfavorable circumstance does not portend that a partial cutoff is of negligible value. Ample proof, both experimental and analytical, of the value of partial cutoffs in the general case is available in current engineering literature. Partial cutoffs are, of course, susceptible of evaluation by means of flow-net analyses.

In the specific case of Mississippi River levees, a leading consultant and recognized authority in the field of soil mechanics and earth structures considers that a 30-ft. cutoff would be adequate to interrupt flow channels most apt to induce piping. The practical value of the partial cutoff being already recognized in a qualitative sense, the quantitative determination of its efficacy is contemplated in extension of the field tests previously described. It follows that the present objective of a 40-ft. cutoff, even though partial in reach, offers practical value in efficacy, provided that it is obtainable at reasonable cost.

Cost less than sheetpile cutoff

The item of cost, then, is the second —but vital—aspect of the impervious cutoff trench that is open to question. The initial experimental work as described affords no index of unit costs on a production basis. Nevertheless, it already has demonstrated that a 40-ft. impervious cutoff would be less costly than a steel sheetpile cutoff of equal depth and would be within the same range of cost as an 80-ft. land-side seepage berm. The ultimate cost of the impervious cutoff should, of course, be reasonably commensurate with its practical benefits and with the first cost of the principal structure (currently in the range of $250,000 per mile for standard levees of average height). Although presently indicated costs are still relatively high, it is logical to believe that substantially lower costs will come inevitably with extended applications.

The practical judgment of many engineers experienced in the design and construction of earth dams and levees is that the impervious cutoff as now being developed is sound in theory and feasible of execution. It is appealing to them because it offers a practical and economical method of solving the perennial seepage problem. This confidence is evidenced by the acceptance of the results of the initial field tests and the consequent undertaking of full-scale application without awaiting verification by means of model tests or theoretical analyses. It is readily recognized that, the principal being sound, the development of efficient applicatory technique is a practical field (and factory) job rather than an academic laboratory problem.

The potential field of application for an impervious cutoff as described herein; *i.e.*, the type of structure and conditions for which it may be used, are clearly indicated by its inherent properties. Its usefulness with respect to certain cases previously discussed has already been accepted though not altogether proven. With respect to other employments to be mentioned, its practicability is still conjectural.

In the case of existing levees, the addition of an impervious partial cutoff to intercept under-seepage can be accomplished effectively by trenching just riverward of the river-side toe. A small impervious connecting berm to tie the cutoff into the impervious embankment is required where the top impervious soil layer is relatively thin, discontinuous or non-existent.

Prevention of through-seepage in existing levees is accomplishable by cutoff trenching through the crown; *i. e.*, through the midsection of the embankment. This procedure should be relatively simple since it involves no groundwater problem and because it may even permit the omission of slurry when the trench is cut through well-compacted, relatively dry and stable materials.

Applicable to earth dams

For existing dams, treatment of under-seepage involves practically the same procedure as for existing levees, except that construction feasibility will necessarily be determined by reservoir levels, which may preclude the application of the treatment in many instances. For treatment of the more infrequent problem of through-seepage in existing dams, application is limited to structures whose height does not exceed the maximum digging depth of the excavating machine which, in the case of trench excavators, is presently about 40 ft.

For new structures such as dams, levees, floodwalls, etc., founded on pervious substrata (other than rock) the under-seepage cutoff trench can be installed to serve the same purpose as a sheetpile cutoff wall. The trench may be located as proposed above for existing structures or it may be placed directly under the impervious zone of the embankment in order to obviate the connecting berm. Choice of location should be governed mainly by considerations of non-interference with primary construction operations; *viz.*, embankment or main wall construction.

Effective for high dams

To counteract through-seepage in the construction of new earth dams and levees the proposed treatment has the potentiality of being applicable to a structure of any height. This can be accomplished by simply trenching in successive lifts during construction of the embankment, the height of lift (and depth of trench) being dependent on the capabilities of trenching equipment and on coordination of the trenching with other construction operations.

By adopting moderate lift heights, use of slurry to maintain stability of the trench may be eliminated. Thus applied, the impervious cutoff or core wall offers the worth while possibility of permitting greater range or choice in the utilization of available borrow materials with correspondingly less emphasis on moisture control and compaction requirements for the embankment. Such a rational development obviously would open the way for major simplifications in design and resultant economies in construction of earth structures.

Development work on the clay-puddle cutoff described herein was started under the supervision of Maj. Gen. M. C. Tyler, United States Army (Retired), as president of the Mississippi River Commission. As originator of the basic idea while serving as military assistant to the president, Mississippi River Commission, the author has continued to serve in a consulting capacity in its development.

Water Standards for Potomac River Basin

***Contents in Brief**—As a major step toward pollution abatement in the Potomac River basin, minimum water-quality standards have been adopted for all sections of the river and its tributaries. Streams draining more than two-thirds of the basin are to be cleaned up sufficiently for safe bathing and for support of all types of fish life. Extensive construction is planned.*

MINIMUM water-quality standards for all the streams in the Potomac drainage area have been adopted by the Interstate Commission on the Potomac River Basin. The criteria were accepted unanimously on May 24 at a meeting in New Germany, Md., by representatives of Maryland, Pennsylvania, Virginia, West Virginia, the District of Columbia, the Office of the Chief of Engineers of the U. S. Army, and the U. S. Public Health Service.

The Potomac Basin has an area of 14,500 sq. mi. Conditions vary widely from stream to stream and from season to season on a given river. Therefore, it was considered illogical to adopt one general standard for the entire area. Instead, four standards designated A, B, C and D were developed. All portions of the basin have been classified, as shown by the accompanying map. The criteria are looked upon as minimum requirements only and as a guide of water quality, not as rigid standards. As the pollution abatement program now proposed is carried out the classification for a given area will be raised.

Work started in 1938

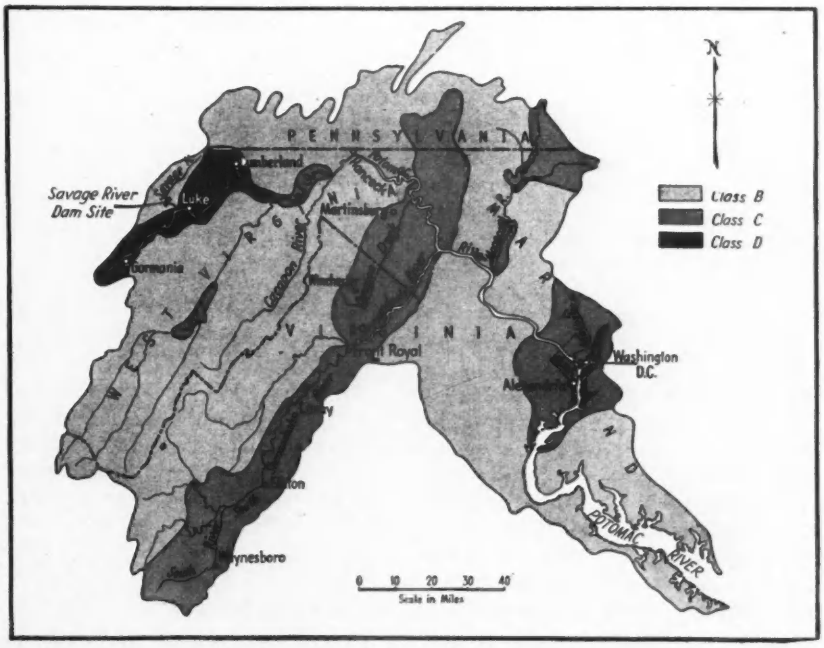
In October, 1938, a compact aimed at pollution abatement and other benefits in the basin was adopted but it did not become fully effective until last year, when the governor of Pennsylvania signed the agreement (*ENR* Aug. 16, 1945, vol. p. 203). Meantime a technical committee worked out the standards that have now been adopted. Many data have also been gathered on the characteristics of the various rivers, the extent of pollution in each stream, and the overall remedial measures in the basin.

This latter study revealed that because of pollution many losses pertaining to fishing, recreation, mineral production and the treatment of public and industrial water supplies occur in the Potomac basin, which contains 950,000 acres of forest reserve of considerable recreational importance. The studies also showed that urban areas discharge sanitary sewage into surface waters of the basin at an average rate of about 190 mgd. Of this amount, 20 mgd. receives no treatment, 153 mgd. are given primary treatment, and 17 mgd. receive secondary treatment.

The contributing population load within the basin approximates 1,520,000 persons before treatment, which is reduced before discharge to streams to a population loading of about 1,000,000 persons. Approximately 50 communities of over 500 inhabitants do not have public sewers. Of this number, however, there are only two with a population of over 2,000, namely, Greencastle, Pa., and Mt. Savage, Md., and each of these have less than 4,000.

Many industrial wastes also are discharged into the Potomac and its tributaries. Of the 98 industries discharging wastes directly to the streams and not to municipal treatment facilities, 48 manufacturing plants with a total discharge of about 32 mgd. treat their wastes in some manner or have changed their processes to reduce the pollution load. The 50 plants not treating their wastes discharge about 21 mgd. The industries are relatively scattered, but there is some indication that their number and size is increasing in the Shenandoah River valley. The combined industrial load within the basin is estimated to be about equal to the wastes of half a million persons.

In addition to sanitary and indus-



Waters of the entire Potomac basin have been placed in one of three general classes, dependent on the degree of purity that can be obtained in a few years. As yet no areas have been designated Class A water or that suitable for a municipal supply after chlorination only, but with the collection of more data several mountain streams are expected to be placed in this category.

trial wastes, the North Branch of the Potomac River receives acid drainage from active and abandoned coal mines. Some of the streams in this area receive enough mine drainage to render them barren and devoid of fish and plant life. It is estimated that 172,800 lb. of acid wastes per day are discharged to the streams in this region and that after all economical mine-sealing has been accomplished there will still be about 110,000 lb. per day.

Water quality in the North Branch of the Potomac is sub-standard between the town of Gormania, W. Va., and the mouth of the Cacapon River above Hancock, Md. This includes, of course, the highly polluted Lake Cumberland area. Other regions in the Potomac basin where flows are now below the quality standard shown on the map are the Washington, D. C., area, scattered areas in the Shenandoah valley, and on Opequon Creek near Winchester, Va., and Martinsburg, W. Va.

In setting up standards to reduce the pollution the technical committee of the commission agreed that: (1) The standards should not be rigid criteria; (2) they should govern minimum quality only; (3) the criteria should be reasonable in the light of present-day knowledge; (4) the standards should be capable of being met within the limits of present-day treatment practices; and (5) they should be determined easily.

Stream classifications defined

The final consensus was to define Class A water as that which can be used for a municipal supply without treatment other than chlorination. On the map reproduced it will be noted that no areas of this classification are indicated. This quality of flow occurs only on a few mountain streams free of pollution and sufficient data are lacking at this time to define these areas accurately. Only about 5 percent of the entire basin are believed to equal this standard.

Class B water is defined as that readily permitting bathing and all recreational activities and supporting the higher types of fish and plant life. About two-thirds of the Potomac basin have been placed in this classification.

Waters that can be used, after complete treatment, for domestic and industrial process water supplies are designated as Class C. Streams placed in this class can be used for recreational purposes, except bathing. These waters should also support most types of fresh-water fish life.

Only a small area—perhaps 5 to 8 percent of the basin—has been placed in Class D. This water is expected to support the lower forms of fish life and can be used for some recreational purposes. The water will be free, of course, of offensive odors, but the dissolved oxygen content will be low.

How criteria will be used

In using the criteria and the area classification map reproduced, the technical committee has recommended that five general principles be followed These are:

(1) the standards and the map are to be used only as a guide to the purity of a water course and only then in connection with a sanitary survey of the area;

(2) in the enforcement of pollution control it may prove simpler for each pollution control agency to set up its own standards for waste discharge which would provide stream quality equal to the commission's criteria;

(3) the classification adopted is that which the commission believes can be reasonably met in the next few years and is considered the first step in obtaining the objectives of the Interstate Commission, changes in the map to be made as conditions warrant and better information becomes available;

(4) as the criteria and classification map are used and as progress in the treatment of wastes advances, the standards and map must be changed; and

(5) analyses and tests regarding minimum requirements shall be determined in accordance with the latest edition of "Standard Methods for the Examination of Water and Sewage" of the American Public Health Association.

Members of the Interstate Commission are much encouraged with the plans now being advanced to bring all areas in the basin up to the standard indicated on the map. These developments include an agreement now being worked out between the District of Columbia and the Washington Suburban Sanitary District for treating the domestic sewage from Montgomery and Prince Georges counties in Maryland. The District of Columbia has also announced plans to enlarge the capacity of its treatment plant from 130 to 175 mgd. to permit 70 percent removal of biochemical oxygen demand from the sewage from the area, which compares with about 33 percent removal at present. Arlington County and Alexandria, Va., are also preparing plans for improved sewage treatment.

In the Shenandoah valley the city of Waynesboro Va., has engaged a consultant to prepare plans for treatment facilities. At Front Royal, Va., the American Viscose Corp. is enlarging facilities to treat its industrial wastes. No definite plans have been announced for treating domestic wastes from Elkton and Luray, and industrial waste discharges at Waynesboro, Va.

The city of Winchester, Va., has ready plans for construction of a treatment plant as soon as building materials become available and financing details have been completed. At Martinsburg, W. Va., no definite plans have been announced for the construction of facilities to treat that city's domestic and industrial wastes. However, the West Virginia Water Commission has requested the municipality to report on what it proposes to do toward pollution abatement.

Plan to complete Savage River Dam

Progress is also being made in the plan to complete Savage River Dam, which is located southwest of Cumberland, Md., on the river of that name. The U. S. Army Engineers recently reported that this structure would not only provide benefits by increasing dry-weather flows above Cumberland, but that it offers flood control benefits as well. The dam is now about 75 percent complete and the remaining work is expected to cost $2,100,000. The flood control bill (H.R. 6597) now before Congress authorizes the appropriation of $1,900,000 for this project.

Even with completion of the dam and the construction of facilities to treat the extensive domestic and industrial wastes now dumped into the river in the Cumberland area, additional low-water flow control projects and a program for the elimination of much of the acid mine wastes will be necessary before this portion of the river will meet the water quality classifications established by the commission.

Additional details on the new standards adopted can be obtained from Edwin R. Cotton, Engineer-Secretary, the Interstate Commission on the Potomac River Basin, 520 Transportation Bldg., Washington 6, D. C.

SKIMMING TRENCH SOLVES . . . .

A Coral Island Water Supply Problem

Joseph P. Lawlor
President, General Filter Co., Ames, Iowa

***Editor's Note**—Quality rather than quantity determines the safe yield of drilled wells on islands in the Pacific where a lens of fresh water generally is found "floating" on salt water. To avoid the damages of salt-water incursion during periods of excessive drawdown, a skimming principle is applied. Perhaps the earliest and most extensive use of this principle is to be found in the Hawaiian Islands (ENR Mar. 25, 1937, vol. p. 450). More recently on Guam, an installation of tunnels for skimming water, similar to those in Hawaii, was described in this journal (Sept. 6, 1945, vol. p. 316). The following article describes a modified type of skimming installation on Tinian Island in which a trench containing infiltration facilities was employed. Commander Lawlor, the author, was officer-in-charge of the 92nd Seabee battalion when the Tinian water supply was built in the summer of 1945.*

DEVELOPMENT of a large supply of potable water on Tinian Island posed a problem analogous to that of skimming the cream from a pan of milk and led to the installation of what has since become known as the Marpo skimming trench.

Conditions on the island, which is largely coral, revealed two important facts, namely: (1) Rainfall permeates rapidly through the rock and forms a lens of fresh water that floats on the surrounding salt water; and (2) the static water level is always close to sea level (Fig. 1).

In a permeable coral structure of this nature, fresh water floats on salt water in counterbalance with the sea, because the specific gravity of the fresh water is close to 1.0 while that of the seawater is 1.026, which is equivalent to a rate of 41:40. In other words, it takes 41 ft. of fresh water to counterbalance 40 ft. of salt water.

In the Marpo Valley district of Tinian, for example, the static water level is about 1.6 ft. above sea level. This would indicate that the salt water lies at a depth of 1.6 × 40, or 64 ft. A zone of mixture lies between the fresh water and salt water, its thickness depending upon the tidal fluctuations, diffusion and pumping. The thickness of the potable water lens (water with less than 400 ppm. of salt) is only a few feet.

Therefore, in order to develop a large supply of potable water with a minimum of disturbance of the fresh-water lens, it was imperative to skim the fresh water from the top of the zone of saturation. This was the genesis of the skimming trench development in the Marpo valley.

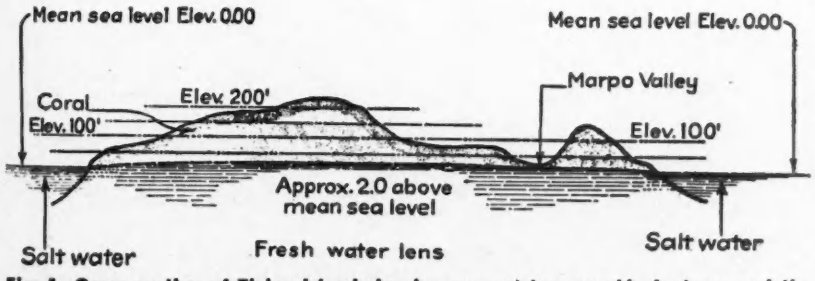


Fig. 1. Cross-section of Tinian Island showing general topographic features and the relation of the fresh-water lens to the surrounding salt water. Marpo Valley (right) is the site of the skimming trench.

The Marpo valley is a natural elliptical basin in the southeast corner of Tinian Island, roughly 5 mi. long and 1½ mi. wide. The lowest part of the basin is at El. 6.0 and the surrounding hills reach as high as El. 500. The catchment area is 7 sq. mi. and there is no surface runoff from the basin although the basin floor has a general slope to the south.

The fact that there are no streams indicates the high permeability of the top soil and coral rock. It was obvious, therefore, that the fresh-water lens should be predominant in the lowest area of this valley. Here the static water level varies with the tide, as much as 0.2 ft.

Selection of Site

An old well installation, located in the Marpo valley, gave fair indication of what might be developed by a well-designed skimming trench in the same general vicinity. Here, two 30-ft. dia. dug wells were capable of producing a total of around 600,000 gpd. with a salt content not in excess of 250 gpm.

A site for the skimming trench was selected at a point about 1,000 ft. north of the old wells. Ground elevation at the site averaged 11 ft., which was also in the lowest area of that basin.

It was arbitrarily decided to make the skimming trench 300 ft. long and place it in a general east and west direction, at right angles to the centerline of Marpo valley. A skimming trench of this size and at the location selected was considered capable of yielding 3 mg. of potable water per day.

A sketch illustrating important features of the completed job, such as rela-

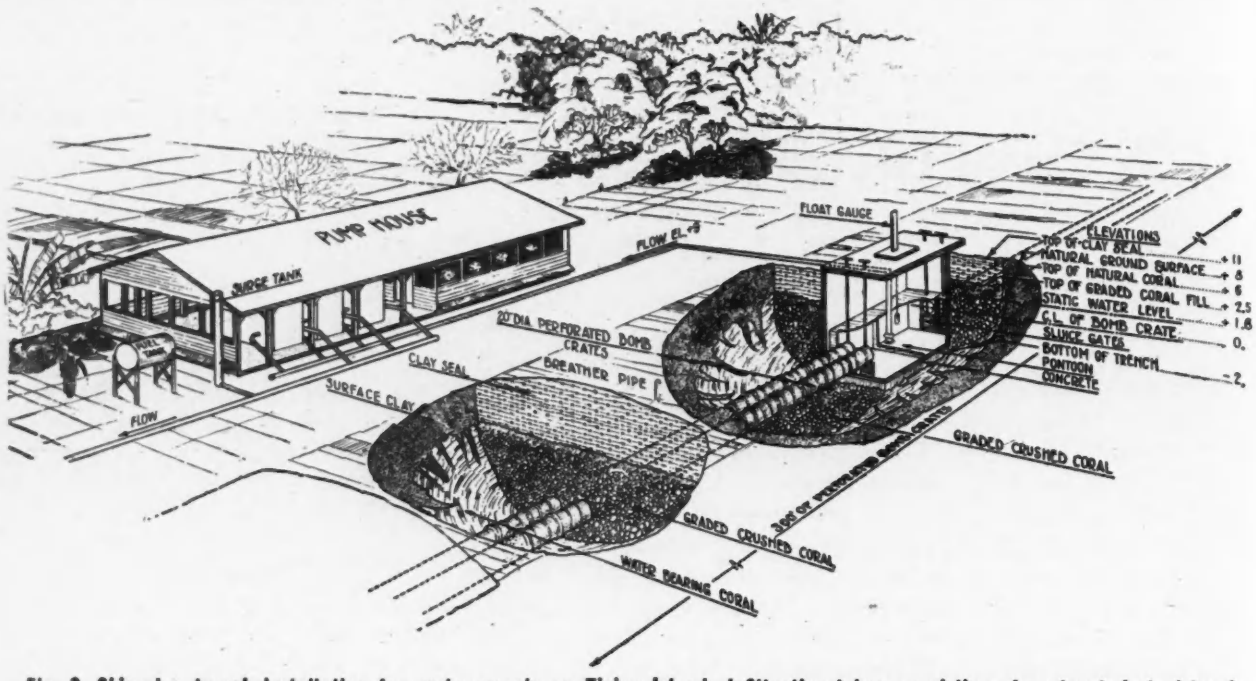


Fig. 2. Skimming trench installation for water supply on Tinian Island. Infiltration tubes, consisting of perforated steel bomb crates, are laid in a trench 3.6 ft. below static water level. Crushed coral is packed around the tubes and the trench backfilled with a clay seal.

tive depths, formations, location of infiltration tubes, suction pit and pumping station is shown in Fig. 2.

After removing 18 in. of top soil, the balance of the skimming trench excavation was in coral limestone. This rock varied in character from fragile to extremely hard, within a distance of inches. Thus, drilling and blasting was required throughout, with results generally unpredictable on account of rock inconsistencies.

The completed trench was 5 ft. wide at the bottom and 15 ft. wide at the top. The bottom was 3.6 ft. below static water level.

The small amount of processed material required to complete this skimming trench is worthy of special notice. A complete list of material required was as follows: 240 salvaged bomb crates, two 5x5x7-ft. (T-6) steel pontoons, 300 cu.yd. of crushed and graded coral and 75 sacks of cement.

Salvaged bomb crates, with ends removed, served as infiltration tubes. These steel crates were 20 in. in diameter, 30 in. long, and had a wall thickness of 0.052 in. For their original use, it required two of these cylinders to crate one incendiary bomb. The two sections were held around the bomb by a hinged coupling, and when they were used as infiltration tubes it was not necessary to do any welding because these couplings served to join the tubes.

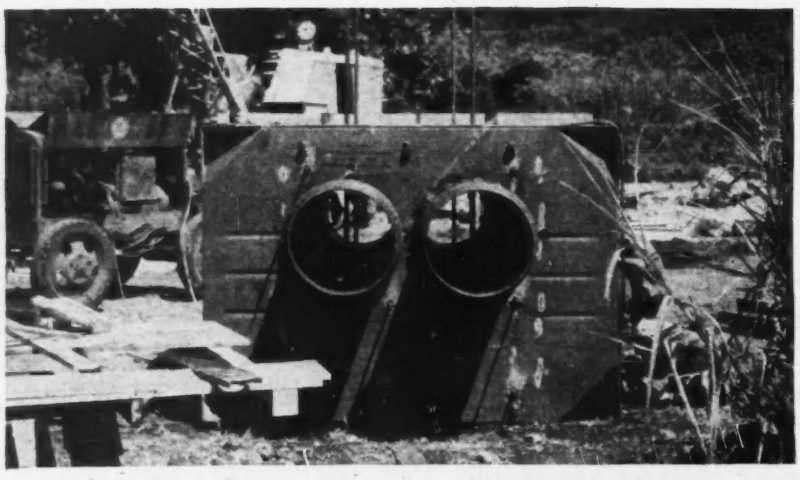


Fig. 3. Suction pit lining was formed with two standard Navy pontoons welded together. This photo also shows how the infiltration tubes enter the pit section.

Perforations made in the crates were $\frac{1}{4}$ by $1\frac{1}{2}$ in., spaced 2 in. apart, making a total of 70,000 perforations in all. A double row of crates was placed in the trench.

The suction pit was placed midway between the ends of the 300-ft. trench and the four bomb crate lines terminated in the pontoon portion of the suction pit.

The lower lining of the suction pit was made with the two pontoons welded together, the adjoining walls being removed. The pontoons are shown in Fig. 3 ready for lowering into place, with the bomb crates welded into them.

Crushed and graded rock, supporting and surrounding the bomb crate tubes was selected from a coral pit containing unusually hard material. After crushing at the pit it was partly screened, then hauled to the construc-

tion site where it was again screened and placed in the trench.

Crushed coral surrounding the perforated crates was about 1½ in. in dia., and extends from the bottom of the trench to a level 8 in. above the perforated infiltration tubes. The fines left over from the screening at the construction site were placed in a layer 4 in. thick between the top of the 1½-in. dia. bed and the clay seal. The clay seal was mounded along the centerline of the trench and all the surface water carefully drained away.

In Fig. 4 is shown the work nearing completion. The infiltration tubes have been placed and covered with coarse graded coral. The crane is spreading the fine coral from a clam-shell bucket preparatory to backfilling the trench with the clay seal.

The pumping station consists of three-Diesel engine-driven horizontal centrifugal pumps, each rated at 1,000 gpm. against a total head of 300 ft. The centerline of pump suction is set at El. 12 ft.

Some operating results

When not pumping, the salt content of the water in the trench is 85 ppm. When pumping at the rate of 2 mgd. the salt content does not exceed 100 ppm. A four-hour test at a pumping rate of 4 mgd. brought the salt content up to 115 ppm.

When pumping at 2 mgd., the water in the suction pit lowers only 5 in.

Fig. 4. Backfilling the trench with fine-screened coral. The final cover was clay, which serves as a seal against surface seepage.

There may be some doubt as to the life of the infiltration tubes made of bomb crates. The water has a pH of 7.2, a hardness of approximately 10 grains per gallon, and a temperature of 85 deg. F. It is not likely, therefore, to be very corrosive. The slow cementing action of the surrounding crushed coral will doubtless continue to hold the rock in the position of an infiltration tube after the perforated bomb crates have rusted away.

It is believed that the Marpo skimming trench will be capable of furnishing an ample water supply for the entire island over many years.

This work was one of the many accomplishments of the 92nd Construction Battalion on Tinian. Much credit for the success of the skimming trench is due to Chief W. H. Byrd of Millen, Georgia, and Chief Frank E. Williams of New Milford, Conn. for their resourcefulness on many occasions.

New Collapsible Lighting Standards Designed to Cut Highway Fatalities

New, hollow light-poles that collapse on impact have been installed along a stretch of Cook County (Chicago), Ill., super-highway in an effort to reduce deaths of motorists from collision with road lighting fixtures. The American Public Works Association indicates the need for such action with the statement that 89 Chicago drivers—an average of more than one a month—have been killed in the last five years from crashing into highway light poles. The new experimental poles mount lights 6 ft. 6 in. above the ground instead of the conventional 25 to 30 ft., and cost less than one-fifth as much as the old type. The short poles are not intended for pedestrian illumination and are equipped with shielding devices to minimize strain on motorists' eyes.

Better street lighting needed

One effective means of reducing the number of traffic accidents is to improve street lighting. Surveys in several cities have shown that accidents decline when lighting improves.

In Detroit, 58 persons were killed in 15 months on 31 miles of city streets. When these streets were relighted, traffic fatalities dropped to 13 in the following 18 months.

Hartford, Conn., had a more striking contrast. During a three and a half year period, 32 pedestrians were killed at night on 10 miles of city streets. Only one pedestrian fatality occurred in a similar period following the relighting of the streets.

The rate of traffic collision at 25 of Los Angeles' outlying intersections dropped 78 percent when high level sodium lighting was installed (*ENR* May 30, vol. p. 858). Traffic fatalities at these points totaled 12 during the year prior to relighting and dropped to one death in the year following.

A report from Syracuse, N. Y., indicates that night accidents decreased 23 percent during the year following the relighting of some city streets. Day accidents in the same period increased 23 percent. In addition, following the improvement in street lighting, police records showed a reduction in the night crime record.

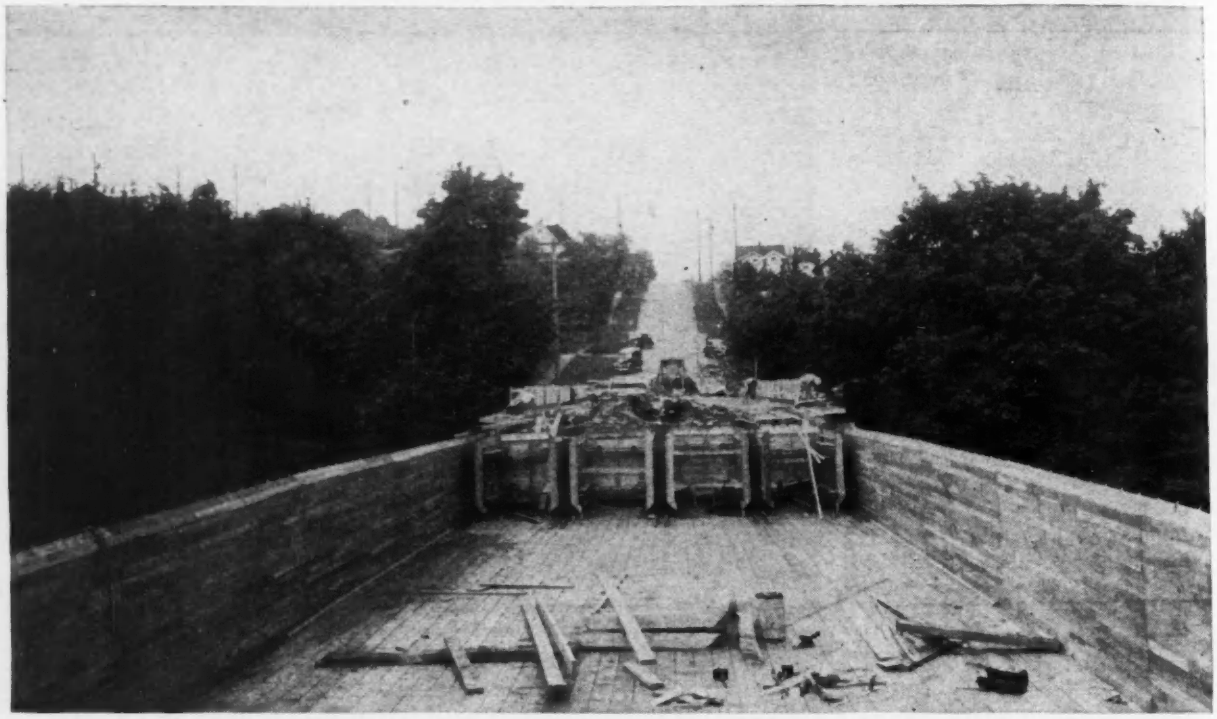


Fig. 1. Assembling forms for thin web box girder bridge at Tacoma, Wash., supported by old steel bridge superstructure.

Box Members Distinguish Concrete Bridge

MASSIVE APPEARANCE, coupled with thin sections, effective disposition of reinforcing and low cost characterize a concrete box girder bridge recently built in Tacoma, Wash., to carry East 30th St. across a 70-ft. ravine and a branch railroad line. The deck consists of four box girder cells having a uniform over-all depth of 6 ft. and a 26-ft. breadth. The girder thus formed is continuous over three spans of 95, 115 and 95 ft. respectively, and small abutment structures increase the over-all length to 325 ft. The contract price was $52,889 (let February 1945), some 20 percent lower than the bid on a competitive timber design (200-ft. trussed arch with trestle bent approaches). Other concrete box girder bridges have been described in *ENR* July 24, 1937, vol. p. 939 and *ENR* Nov. 19, 1942, vol. p. 698.

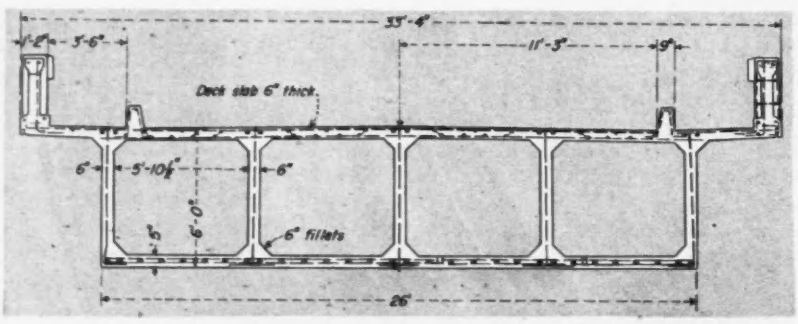


Fig. 2. Features of the bridge cross-section, shown here at the center of the main span, are the thin webs and slabs and the absence of longitudinal steel in the webs whose reinforcement consists only of vertical stirrups.

In the supporting columns for the East 30th St. Bridge, hollow design is also employed. Made 5½ ft. square with 6-in. walls and 8-in. corner fillets, the hollow columns contain the same amount of concrete as solid columns 3 ft. 4 in. square. Similarly, the deep plate, which the deck appears to be, required no more concrete than would have been used in a solid slab 21 in. thick. In addition to economy, this hollow type construction eliminates excess weight, which greatly increases practical span lengths, and also permits more effective placement of the reinforcing.

In the deck of the new bridge, there are 5-in. transverse diaphragms that divide the spans into panels about 22 ft. long—four panels in the 95-ft. spans and five panels in the 115-ft. spans. Running the length of the bridge are

five webs, everywhere of 6-in. thickness except in the panels either side of the supports where they are 10 in. thick for about half the panel length and 8 in. thick for the remainder. In these same end panels the bottom slab, normally 5 in. thick, is 6 in. thick.

Although the total of the web thickness for the entire bridge is only 30 in., integral interconnection and mutual bracing of all parts give the bridge great rigidity; it has successfully carried all loads and is said to be wholly without vibration. More web thickness, with its additional dead weight is unnecessary, the designers point out, when opportunity for the placement of tension reinforcement is otherwise provided, *i.e.*, in the slabs.

Unusual reinforcing

The longitudinal bars, usually bent up and extended across supports in continuous girders, were omitted from these narrow-webbed beams as they would have seriously interferred with concrete placement. However, adequate strength was provided by vertical stirrups and by the main longitudinal bars, placed both top and bottom with no bends. Those pairs of longitudinal bars closest to the webs, both top and bottom, were made continuous from end to end of the bridge, laps being made at contraflexure points. All other bars were stopped off, with 40-dia. additional anchorage and in staggered pattern, as moment changes permitted. Bars were distributed in a single layer uniformly across the full breadth of both slabs.

The bridge is on a one percent grade. At the lower end the girder was fixed to the abutment and, as the columns are long, the deck was made continuous and without joint to the abutment at the far end of the bridge. There it was supported on 8-in. extra heavy steel pipe rollers, filled with rich, vibrated concrete and closed at the ends by steel disks, welded on. This design was patterned after that of several earlier bridges in which the advantage of these features was demonstrated.

As the deck is continuous it reacts to horizontal forces, (caused by wind and any other lateral loads) as a beam spanning between the abutments. At the free end, four 16x23½-in. shear keys, projecting downward from the end diaphragm of the box girder, extend 8 in. into corresponding pockets between the rollers. These keys have ¼-in. clearance on sides and bottom. Friction of the rollers upon their plates is quite sufficient reaction for any ordinary conditions, and the interlock here provided insures against earthquake displacement, a not impossible contingency.

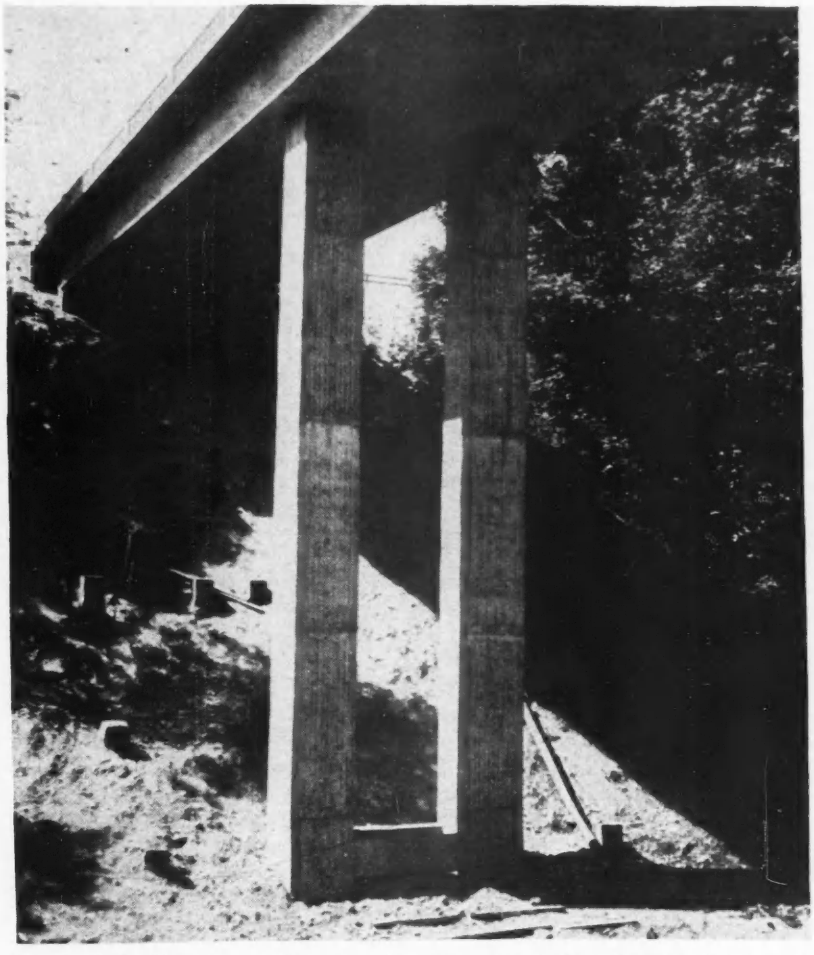


Fig. 3. Underside view of the completed bridge emphasizes the smooth lines and massive appearance of the hollow deck and columns.

The old frame trestle, which the new bridge replaces, could be used as falsework, so its deck was removed and it was cut off at proper height, recapped, braced and strengthened throughout. Upon this support the form for the outer surfaces of the box girder deck of the new bridge was made of 6-in. t. & g. boards. As shown in Fig. 1, the bottom form for the deck made an excellent working platform during the placement of girder steel and cell forms. These latter consisted of panels for webs and top slab made up in the work shed at the end of the bridge.

Panel forms were supported in the correct position on concrete blocks. No top form was used for the bottom slab. This was unnecessary as the concrete dumped into the webs and vibrated could easily be worked across the full width of the cell, if necessary, by the finishers who entered the cell spaces through manholes left in the top slab forms. Workmen in the cell spaces spread this concrete and brought it to proper thickness as in laying pavement. By allowing time for the slab concrete to stiffen somewhat before completely filling the web forms, the slab served effectively to close off the bottom of the web forms which could then be poured full, completing slab and webs in the same operation. All inner forms were left in place.

The bridge was designed by the city engineer's staff and was placed under contact while Oscar H. Hallberg was acting city engineer of Tacoma. The contract was completed under Burwell Bantz, the present city engineer.

Practical Repair Methods For Disintegrated Concrete Tunnel Lining

W. W. Morrison
Vice President, Pittsburg & Shawmut R. R.
Kittanning, Pa.

Elwyn E. Seelye
Consulting Engineer
New York City

***Contents in Brief**—When poor concrete and badly conceived details result in disintegration and cracking of concrete linings in railroad tunnels, major reconstruction is usually required. Thrust blocks cast in holes cut through the lining will furnish springline support for the arch. Walls of brick pilasters and timber breast boards or continuous brick walls can replace old walls if clearances permit. If not, new concrete facing can be applied. New gutters of non-freeze type are often dictated. Ample weep holes are a necessity, as is a backfill or packing of porous rock.*

AS THE COUNTRY grows older the repair of structures and the reporting thereof becomes increasingly important. And although descriptions of methods by which repairs are made will be useful it will be much more significant if the discussions can be analytical as to the cause of the failure and the reasons for the use of particular repair methods. It is with this latter thought in mind that the authors have prepared this article on concrete linings of railroad tunnels in general and recent work done on the Pittsburg & Shawmut R.R. in Pennsylvania in particular.

The observed causes of disintegration of tunnel linings are:

1. Structural failures, such as the cracking of an arch due to lack of skewback support.

2. Disintegration of the concrete due to low grade concreting operations leaving it vulnerable to frost action, to chemical reactions of ground-water and locomotive gases, and to disintegration as a result of lack of adequate drainage for seepage water.

In regard to structural failures, one very common type results from lining a tunnel with timber—an inside sheathing serving as the outside form for the concrete lining and an outside sheathing being placed to support the packing, of earth, rock or even cord wood, between the breakage lines and the tunnel timbering (Fig. 1). The void space between the concrete and the packing depends for its permanence upon the life of the timber. The result is that when the timber decays in the course of 10 to 30 years, the concrete arch is left more or less unsupported at its springing line. This in turn results in the straining of the arch at the springing lines and consequent cracking and disintegration at the crown and side walls. Moreover, as also shown in Fig. 1, heavy falls of rock may load the arch eccentrically, making lateral support for the arch necessary.

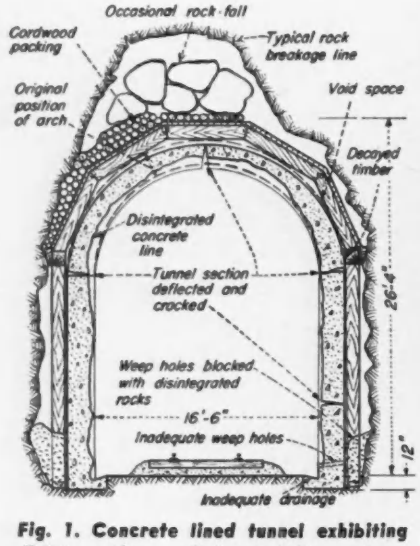


Fig. 1. Concrete lined tunnel exhibiting disintegration and local failures from design and construction errors.

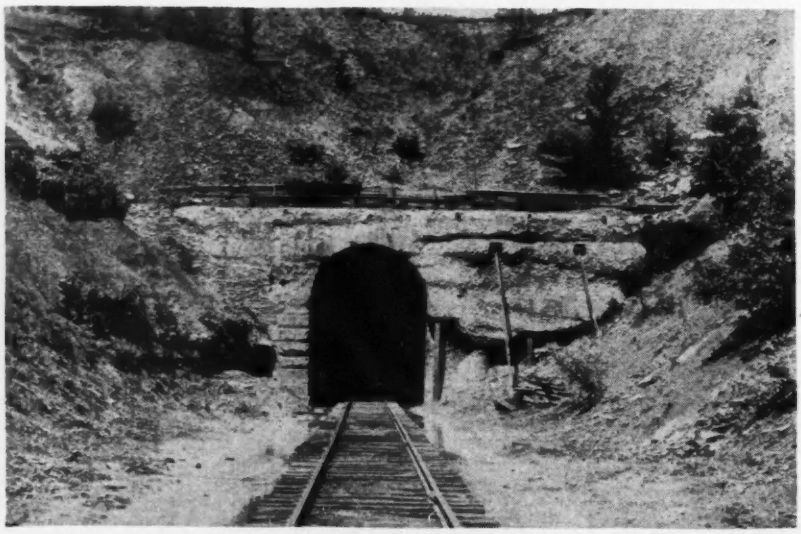
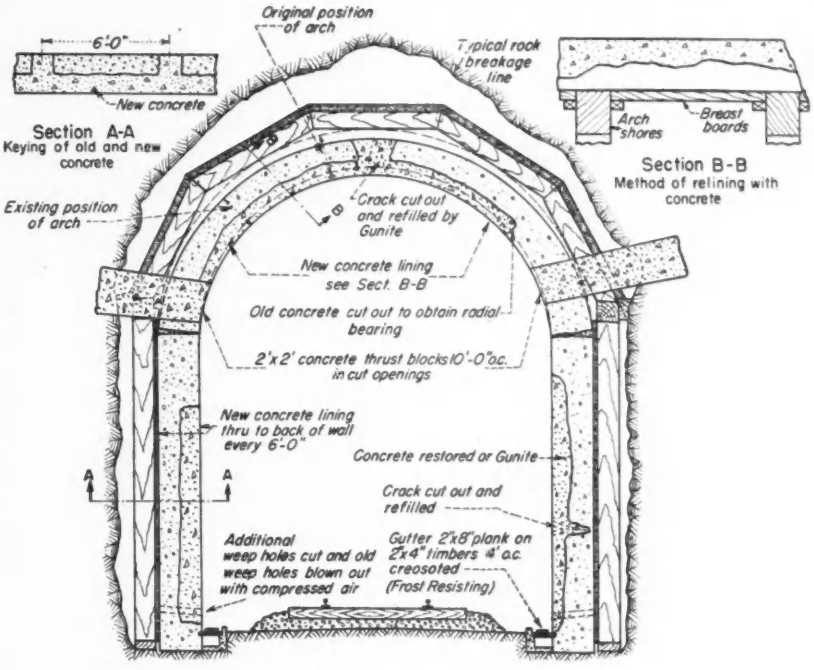


Fig. 2. Poorly designed headwall suffers damage from slides. It should have been provided with wing walls to contain slides and act as buttresses.


6'-0"
New concrete
Section A-A
Keying of old and new concrete
Original position of arch
Typical rock breakage line
Arch shores
Breast boards
Section B-B
Method of relining with concrete
Existing position of arch
Crack cut out and refilled by Gunite
New concrete lining see Sect. B-B
Old concrete cut out to obtain radial bearing
2'x2' concrete thrust blocks 10'-0" oc. in cut openings
New concrete lining thru to back of wall every 6'-0"
Concrete restored or Gunite
Crack cut out and refilled
Additional weep holes cut and old weep holes blown out with compressed air
Gutter 2"x8" plank on 2"x4" timbers 4' o.c. creosoted (Frost Resisting)

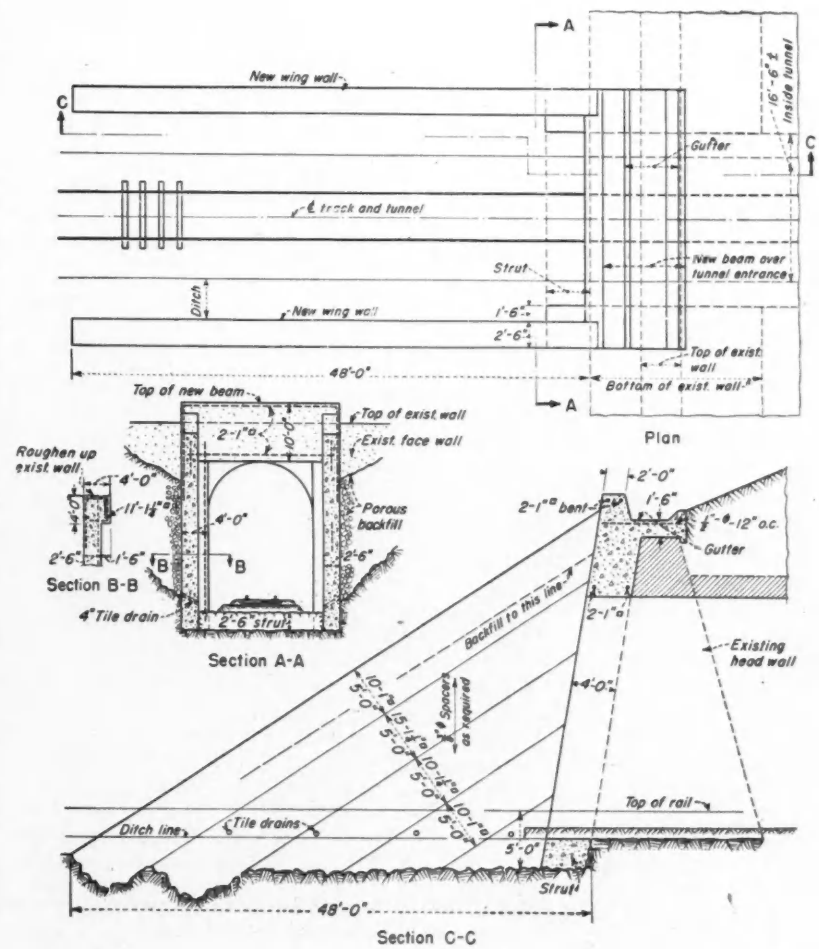


Fig. 3. Suggested repair details for damaged tunnel shown in Fig. 1. The thrust blocks provide necessary springline support. New gutter is of non-freeze design.

This practice came about from following blindly certain standards that show concrete tunnels built against wood timbering of a type which could only temporarily provide adequate skewback reaction. One way to arrest this movement in existing tunnels is to cut "windows" in the walls, and build "thrust blocks" with solid bearings against the side of the excavation as shown in Fig. 3. But even with these thrust blocks, the arch above may require some additional strength, such as support above the springing lines.

Defects in portal design

Another structural weakness often encountered results from construction of face or portal walls at right angles to the axis of the tunnel instead of using wing walls. The photograph of a tunnel portal, Fig. 2 clearly illustrates how circular slides, which readily occur in certain types of material, as for example coal measures that carry clay, may put a tremendous load on face walls and bring them down. Wing walls in such a layout would serve as buttresses for the head wall and act as a retaining wall for material that thrusts against it from a lateral direction.

A head wall of reasonably low cost and effective design is shown in Fig. 4, which also depicts the repair done to the wall of Fig. 2. In this design, it is to be noted that the reinforcement in the wing walls runs on a slope and thus resists the thrusts of the earth behind the wall, including the heavy surcharge. Each wing wall acts as a reinforced slab, which reacts against the new face wall of the head wall at its upper end and against the undisturbed shale, limestone or earth below the cut for the track ditch at its lower end. It is to be noted that by this method of reinforcing the wing walls, it is not necessary to cut back into the

Fig. 4. Repair and reconstruction of headwall shown in Fig. 2 involves addition of wingwalls and a cap beam. Note that reinforcing steel in wingwalls is on a slope to resist better the thrust behind the wall.

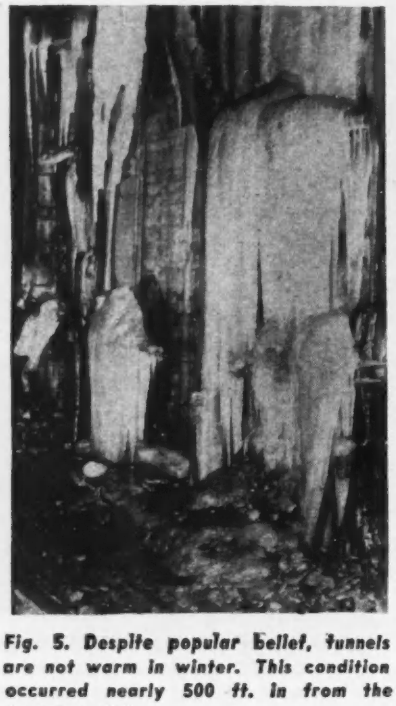


Fig. 5. Despite popular belief, tunnels are not warm in winter. This condition occurred nearly 500 ft. in from the tunnel portal.

Fig. 6. Replacing a tunnel wall by underpinning the arch. New brick piers are being built alternating with timber shores that support the arch.

slide slopes to get room for a full retaining wall section. Moreover the excavation required is less than for wing walls built at an angle to the track.

Where the head wall is not approached in a deep cut, wing walls set at an angle to the centerline of the track should be used. However, where the approach cut and overburden is rock, a 90-deg. face wall is most economical, except that in narrow rock cuts a straight head wall would be favored.

Reasons for disintegration

The cause of disintegration in concrete is often difficult to trace, but it is most often attributable to low grade concreting operations, involving not only the conventional errors of using defective aggregates, a non-uniform mix or excess water but also, and particularly, poor placement of concrete in the difficult location at the crown.

Concrete disintegration may also result from acid conditions in water that is trapped behind concrete walls laid directly against the rock. The remedy is in part better concrete and in part improved drainage, particularly if water tends to collect in the ditches at the base of the tunnel wall. And, finally there is the effect of freezing and thawing on concrete disintegration. That this should be taken into account is evident from observations made by W. P. Geiser, chief engineer of the Pittsburg & Shawmut R.R., that the temperature in the center of a 2,000-ft. tunnel varied only from 10 to 20 deg. above the outside temperature, depending on how frequently trains pistoned the outside air into the interior.

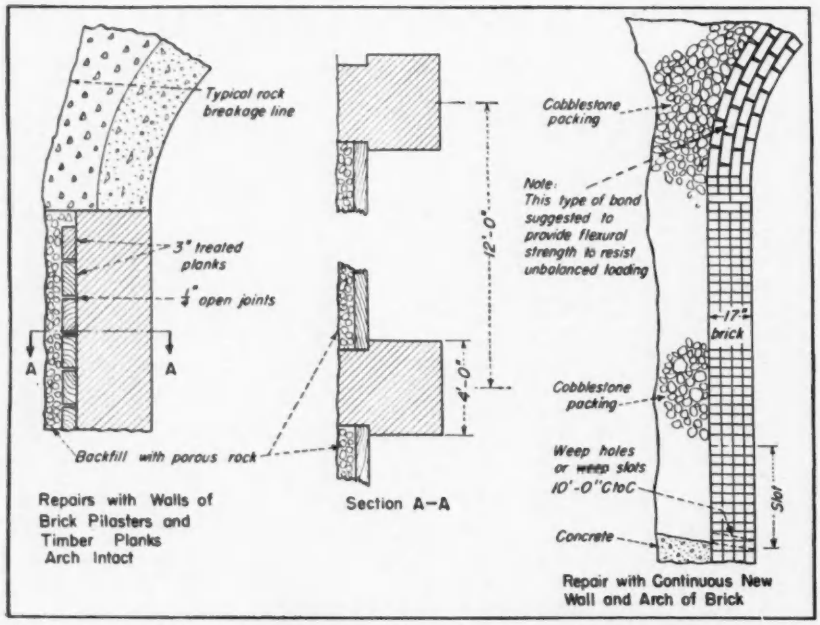


Fig. 7. Two methods of tunnel reconstruction using brick and brick and timber. Note tangentical arrangement of brick in arch to give maximum flexural strength.

Protective measures

To avoid concrete disintegration in new construction, the following steps should be taken:

1. Grade aggregates carefully, and provide skilled workmanship in placing, particularly at the closure. A segment of this closure might be left open and filled with gunite or brick (Fig. 3).

2. The concrete should be made with a sulfate resisting cement such as A.S.T.M. Type III.

3. The drainage design should be

such as to prevent trapping of water against the rear of walls. Adequate track ditches, as shown in Fig. 3, are a necessary part of such a design as are large and numerous weep holes.

In reconstruction, several conditions must be met:

1. It may be necessary to preserve what integrity is left in the tunnel arches and walls, in which case thrust blocks should be constructed at close intervals to support the arch reactions at the springing lines.

2. If the vertical supporting walls are badly disintegrated or entirely gone, they may be replaced section by section, underpinning the arch as a building wall would be underpinned. An underpinning job of this kind is shown in Fig. 6.

3. If both walls and arches are either entirely or partially gone they can be replaced section by section with new masonry—either concrete or brick. The convenience of laying brick in sections has a strong appeal when it is further considered that a good vitrified brick will not disintegrate under mild acid action.

Brick arches, if used, should be parged with a water-proof cement on the top or outside of the ring. A mastic could be used.

Either a pilaster or a continuous wall may be used as shown in Fig. 6. With the pilaster wall, creosoted plank can be used between the pilasters and packed with 3 to 6-in. rock. For the continuous wall care should be taken to use a porous rock packing.

Concrete cheaper than brick

There are good grounds for believing that concrete reconstruction is cheaper than brick. In the placing of concrete, a traveling mixing plant with a moving scaffold, mounted on cars, can be used very successfully. Both concrete and brick reconstruction, of course, require centering that must clear traffic, and a good design is a timber arch type with horizontal breast boards between the arches.

Because of the uncertainty of the packing loads as a result of inequality of breakage lines, tunnel arches may be subject to flexure and should have some strength tangentially. This can be provided if the brick is laid tangentially in the arch instead of longitudinally as in the wall (Fig. 7).

Two methods of reconstructing partially failed tunnels have not been mentioned—the use of steel plates backed with concrete and surfaced with gunite, and the practice of pumping grout behind the concrete lining. Both can be used, but are not favored by the authors because the first introduces permanently into the tunnel a certain amount of steel that is subject to corrosion, while the second is "blind" grouting, which can easily be futile or extravagant.

Average reconstruction costs on typical single-track tunnels run about $300 per linear foot. It was discovered, however, that by employing the methods outlined in this article, the cost could be brought down to $150 per linear foot—even in cases of extreme disintegration.

The Pittsburg & Shawmut project was carried out by company forces under the direction of W. W. Morrison, vice president, and W. P. Geiser, chief engineer. Elwyn E. Seelye & Co. was the consulting engineer represented on the work by Burnside R. Value. The field work was directly in charge of Patrick Murphy of the Seelye organization who designed the construction plant and supervised the repairs.

Higher Suburban Service Charges Help Cities Meet Rising Costs

Many cities recently have increased service charges to suburban residents to help offset rising costs of municipal government. Increased suburban water rates and fire department charges to outlying districts are frequently recurring examples of such action, according to the American Municipal Association.

San Francisco boosted water rates to users outside the city limits on the grounds that municipal residents alone bore the financial burden of acquiring the system. Further, the city has been paying taxes on its water lines outside the corporate limits.

St. Paul, Minn., administrators recently proposed to raise charges for water, sewer, and fire protective services outside the city. Denver, Colo., is currently engaged in a dispute with adjacent communities which have asked for city water but prefer not to be annexed to Denver.

Boulder, Colo., now charges users of city sewer connections outside the corporate limits twice as much for service as residents within the city limits. The action amends a previous ordinance which made no distinction between sewer connection charges within the city limits and those outside.

Fire service charges raised

Fire department fees for service to outlying communities have been doubled in Milwaukee. Under the new rate schedule, a cash deposit of $600 is required for fire protection to neighboring municipalities, plus $300 for the first hour of use and $200 for each subsequent hour.

Smaller cities are also following this trend toward increased fire protective charges. Waukesha, Wis., has authorized a new outside fire service contract with five neighboring towns at a rate of $150 per call.

The village of Hopkins, Minn., has increased the charge on fire department calls outside the corporate limits to $25 for the first call, $15 for the second, and $10 thereafter. St. Helens and Lebanon, Ore., no longer allow use of their fire fighting equipment outside the city limits.

Refuse collection charges were adopted by more cities in 1945 than any other new source of municipal revenue, a survey conducted for the 1946 Municipal Yearbook disclosed. Thirty-two cities initiated such levies last year, including Lewistown, Pa., Vancouver, Wash., and Livingston, Mont. At least 130 cities now make special charges for refuse collection.

Adoption of sewage rental charges last year boosted to 190 the number of cities over 10,000 population now using that means to increase municipal revenues. Various methods of fixing the charge were used. Waco, Tex., now charges sewer rentals based on the number of plumbing fixtures; Xenia, O., last year began a flat charge of $6 per residence annually; Oelwein, Ia., bases its sewage disposal charge on water consumption.

Elastic-Limit Basis for Designing Highway Substructures in Clay Soil

Henry C. Porter
Research Engineer, Texas Highway Department, Austin, Tex.

***Contents in Brief**—Compression tests conducted by gradual incremental loading furnish stress-strain curves that clearly define elastic limits of compacted clay soils. Laboratory results can be reproduced by simple field aparatus for construction control. Working unit stresses of half the elastic limit are suggested for the design of highway substructures.*

A STUDY of stress-strain figures recorded in conducting tests for relative rupture loads of compacted clay cylinders (*ENR* Aug. 23 and Nov. 29, 1945, vol. p. 245 and 726) shows that the elastic limit of the soil structure is well defined. In fact it appears that the elastic limit can be determined more definitely than can be rupture load. Also it is indicated that determination is not only practicable in the laboratory but is possible in the field while clay soils are being compacted for pavement substructures. These conclusions lead directly to the practicability of basing working unit stress on the elastic limit of built-up clay structure as is done with other materials of construction.

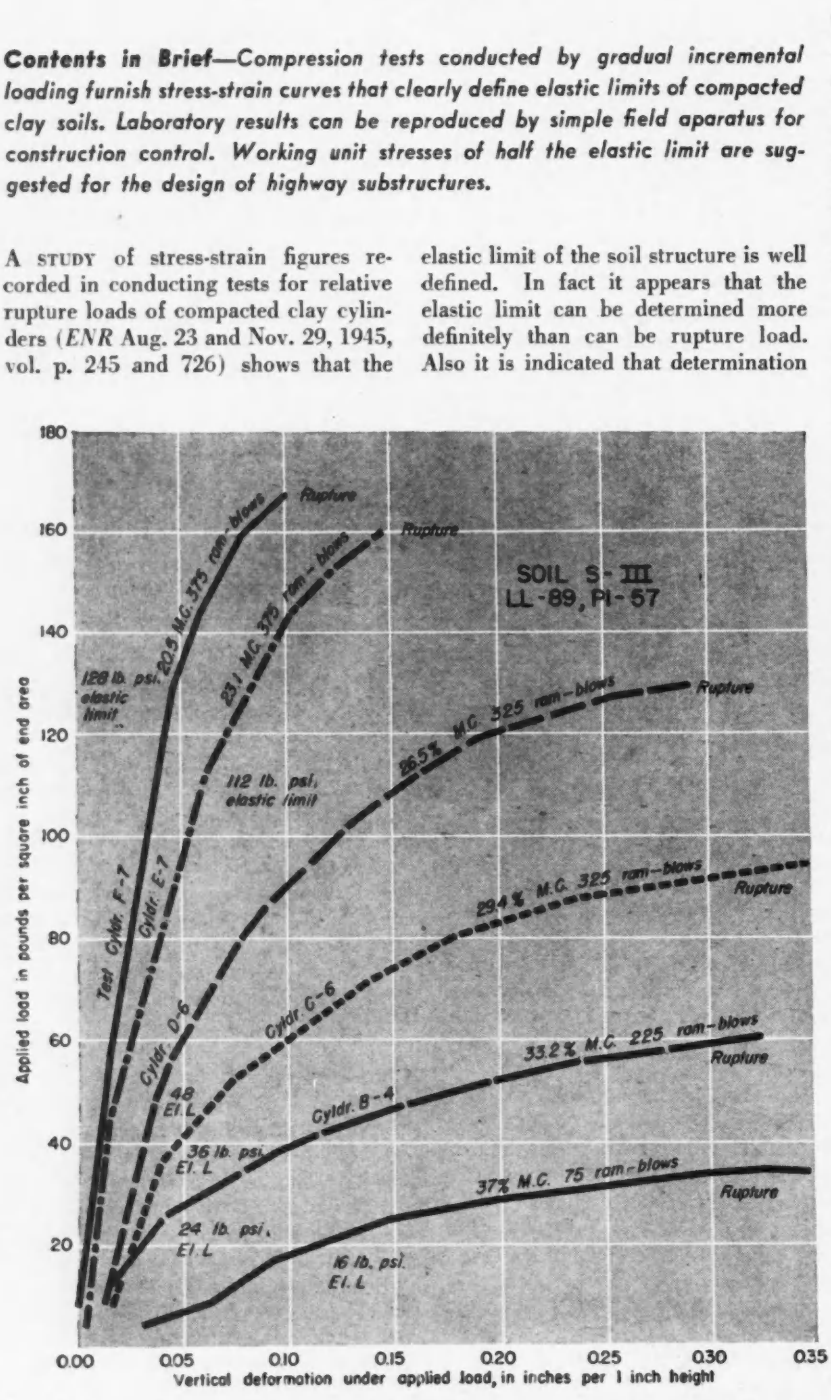


Fig. 1. Stress-strain curves developed by gradual incremental loading clearly define elastic limits of compacted clay soils.

In making the tests for rupture, the load was applied gradually and the vertical deformation of the clay test cylinder was recorded at every 50 or 100-lb. increment of the load. To determine if these data would substantiate the optimum compacting force to maximum compressive strength theory, they were plotted in the form shown in Fig. 1. Beyond stating that substantiation was complete, this phase of study is not further considered.

When it was found also that the stress-strain curves were surprisingly uniform; that the variations in shapes of curves for differently compacted soil cylinders was very uniform; that the ratio of stress to strain was constant up to certain points, and that beyond these points on the curves the ratios decreased until rupture was reached, study of the stress-strain data from the elastic-limit viewpoint was indicated. Since it represents the clay most difficult to handle, soil S-III is chosen for illustration. The rupture-test results on this soil are tabulated and charted in Engineering News-Record, Nov. 29, 1945, vol. p. 726. Stress-strain curves were charted for three different groups of test cylinders of S-III soil.

Elastic-limit determination

Fig. 1 is the chart relating specifically to elastic-limit determination. The curves represent stress-strain development in six samples each with a different water content and each submitted to optimum compacting force for maximum compressive strength. It is seen that the ratio of stress to strain, for each curve as a whole, gradually increases as the moisture content of the test cylinder gradually decreases from 37 percent to 20 percent. The relative rupture load gradually increases. The elastic limit increases from 16 psi. for 37 percent moisture to 128 psi. for 20 percent moisture—a difference of 112 psi. The ratios of relative rupture loads to elastic limits are: 2.09, 2.49, 2.65, 1.42 and 1.31 or an average of 1.97. In the chart it may be noticed that in curves E-7 and F-7 there are slight bends at about the 60 psi. points;

these were caused by a slight defect in the loading machine.

As stated, stress-strain charts were developed for two other groups of test cylinders: Five cylinders, with 30 percent moisture content, and five, with 20 percent moisture content. For the 30 percent group the elastic limits were 36 psi. maximum, 28 psi. minimum and 8 psi. difference. For the 20 percent group the corresponding elastic limits were 128 psi., 72 psi. and 56 psi.

In previous accounts of the tests of compacted clay soils conducted by the author (*ENR* Aug. 23 and Nov. 29, 1945) it has appeared that design should be on the basis of the rupture load or ultimate unit stress with an ample factor of safety. With the test data now determined, design on the basis of elastic limit, as is the practice for other engineering materials, is a practicable consideration. From textbook authority and from actual practice it appears that the working unit stress for which compacted clay soil substructures are designed should not be greater than 50 percent of the elastic limit. This leaves half as a factor of safety, principally for imperfections in construction, subsequent increase of water content not practicable to prevent, future increase in live load, vibration, impact and fatigue.

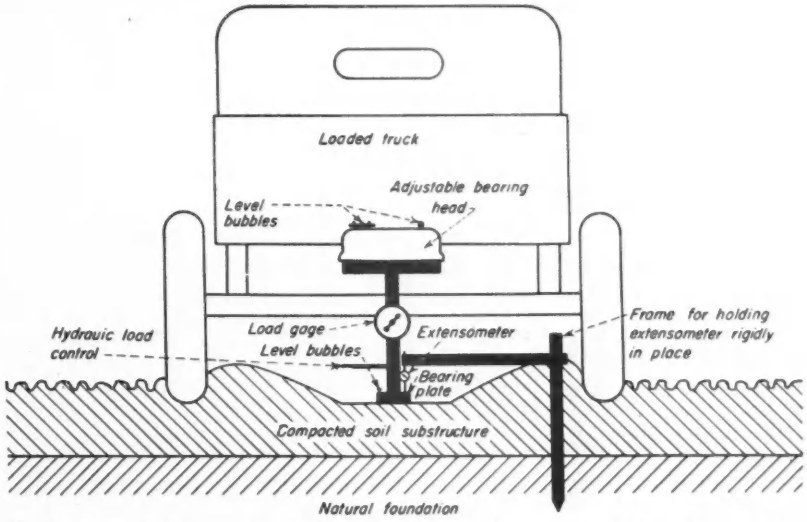


Fig. 2. Suggested apparatus for making clay substructure tests for determination of the elastic limit of the soil in the field.

Laboratory testing for elastic limit is easily devised. An example is the device (*ENR* Aug. 23, 1945, vol. p. 247) used in the tests being considered. The procedure indicated in Fig. 2, could be used in the field to test each layer of subgrade as it is rolled, and rolling continued until the required elastic limit is produced.

Clearing of Blighted Areas Aim of Redevelopment Legislation

Passage of urban redevelopment legislation in Rhode Island and Missouri recently is expected to promote municipal programs aimed at the rehabilitation of blighted areas in those two states. The American Society of Planning Officials reports that with the passage of this legislation 23 states now have some type of urban redevelopment program.

The Rhode Island Community Redevelopment Act provides for city planning commissions with extensive powers to acquire land and bring development projects under control of the municipal government. The state will not grant this power to cities, however, unless they have "master plans" for long-range urban development adopted by their official planning agencies.

The insistence on master plans is aimed at prevention of haphazard city expansion, which might result in new slum areas within a few years. Master plans must include not only a comprehensive land use plan, but also the location of existing and proposed highways and other transportation arteries. Consideration of other vital factors such as population density trends, must likewise be included.

The Rhode Island legislation stipulates that the city legislative body must designate by ordinance all areas intended for redevelopment before redevelopment projects may be given final consideration. Following adoption by the city council of urban development plans submitted by the planning agency, applications for building permits in project areas may be submitted by private builders for council approval.

The city planning agencies themselves are to be financed by municipal funds and may acquire any land in the city for purposes of rehabilitation and development in line with the city master plan. The municipal legislative body may establish a redevelopment revolving fund and issue revenue bonds to help finance such projects. Provision is made for two or more adjacent communities to exercise jointly the powers of the state act.

Redevelopment legislation, such as the Rhode Island and Missouri laws, attempts to provide a firm foundation for city action, but whether or not it is effective depends upon the municipalities in which it is applied.

The Missouri Urban Redevelopment Corporations Act repeals 1943 legislation and provides for municipal redevelopment corporations in cities of 350,000 or more (St. Louis and Kansas City). The new law includes an inducement to private industry to invest in redevelopment projects by providing partial tax exemption over 25 years on the real estate involved.

Missouri cities are empowered by the new act to acquire any lands designated as redevelopment areas on their master plans. The municipality may then lease or sell the land to private investors whose redevelopment plans meet with approval of the city administration and are in harmony with the master plan for the community.

From Field and Office

WORKING PROBLEMS AND TIME-SAVING METHODS FOR ENGINEERS AND CONTRACTORS

Volume of Oxygen in a Cylinder

Oxygen for cutting and welding ordinarily is delivered in cylinders containing 244 cu.ft. of oxygen. These cylinders are about 56 in. tall, including the valve-protecting cap, and have a diameter of about 9 in. They weigh about 150 lb. full and 133 lb. when empty and are charged to a pressure of 2,200 psi. at 70 deg. F.

Since all gases expand when heated and contract when cooled, the pressure of oxygen in the closed cylinder increases or decreases as the temperature changes since the cylinder volume remains constant. By referring to the accompanying chart, an estimate of the volume of oxygen in a cylinder can be made to within 5 or 10 cu.ft., when the approximate temperature is known.

For example, if the oxygen regulator indicates a cylinder pressure of 1,400 psi., and the ambient atmospheric temperature is 60 deg. F., the approximate volume of oxygen in the cylinder is 160 cu.ft. for the standard oxygen cylinder.

Small cylinders, sometimes used, are about 48 in. high and 7 in. in diameter, containing 122 cu.ft. of oxygen when full. Volume indicated on the chart should be halved for use with the small cylinder.

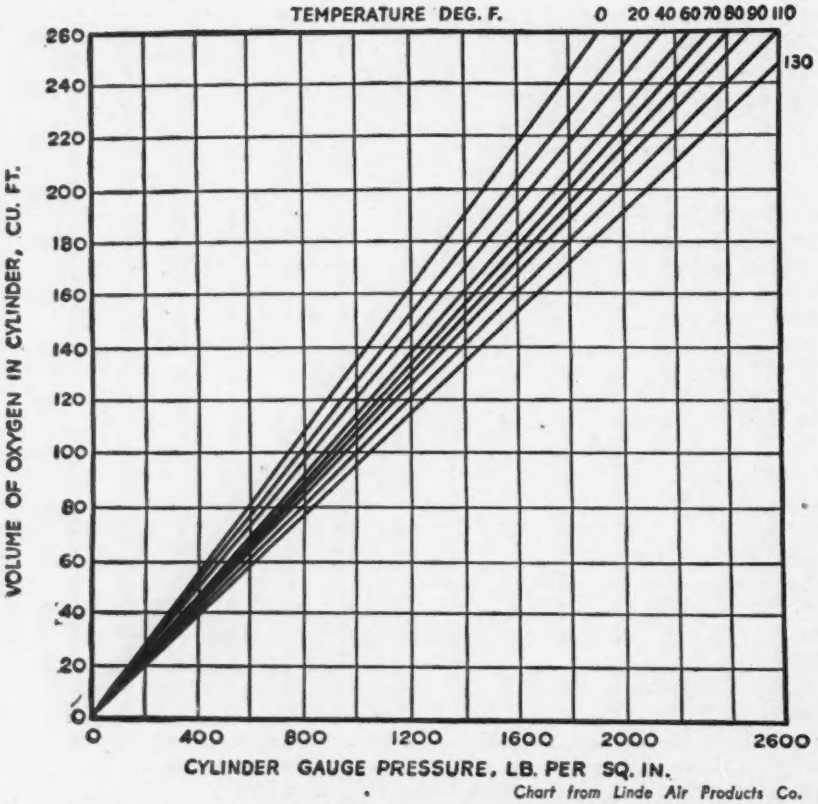


Chart from Linde Air Products Co.

Temperature-pressure-volume relationship of oxygen in standard large cylinder.

Field and Office Comment

Simplified Earthwork Computation

Sir: Many highway and other engineering departments compute earthwork by the double end area method. Commonly, a table is used showing the yardage for various double end areas of 50-ft. sections. The following simplified slide-rule method of earthwork computations gives identical results to the usual tables when using a 20-in. slide rule, and an error of less than 1 cu.yd. for a 50-ft. section with a double end area of 1,000 when using a 10-in. slide rule, and may prove of value to contractors and estimators. The method applies to sections of any length, a feature not found in the common earthwork tables.

Based on the fact that 2 sq.ft. of double end area requires 54 lin. ft. of section for each cubic yard of volume, the method first sets the index of C, D and CI scales all to unity. Then the indicator is set at 54 on the CI, and the slide moved to section length required on CI. The indicator is then set at double end area on C, and the answer read directly in cubic yards on the D scale.

Keeping in mind that the double end area for a 54-ft. section is numerically equal to the yardage, the location of the decimal points in this computation is readily known.—CHAS. F. PARKER, *chief engineer, W. H. Hinman, Inc., North Anson, Me.*

Debris Deflector For Lock Gates

A. B. Rundquist, machinist foreman at the Lake Washington Ship Canal Locks at Seattle, Wash., for the U. S. Army Engineers, has developed a device to keep the lock gates free from debris. An installation of metal pipes extends from the tops of lock walls at quoin castings or "heels" of the gates down to 20 ft. from the chamber floor. A charge of compressed air through the pipes creates a surface current forcing logs and debris away from the gates and out of the chambers.

Six of the devices have been installed in the large locks at a total cost of $1,000 and installation will be made in the small locks.

Rundquist's idea saves labor costs in sweeping gate areas by hand with pike poles and saves substantial repair costs. Tests are being made on extension of the idea to use compressed air for cleaning sunken logs, barnacles and other navigation hazards from chamber floors.

Comment and Discussion

Readers' opinions on matters that concern engineers and contractors

Precast Concrete an Old Story

Sir: The article, "Precast Structural Members Facilitate Speedy Erection of Rigid Frame Buildings," (*ENR* April 18, vol. p. 546) was of great interest to me. The design and methods of construction were most ingenious.

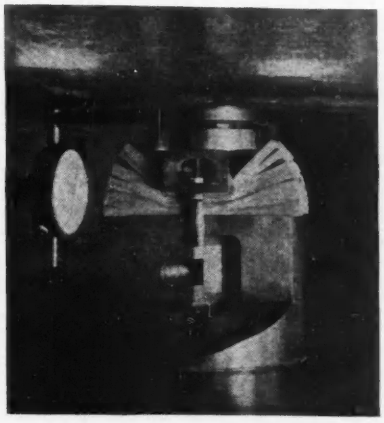
The article recalled my efforts many years ago to convince engineers that precast construction was, in many respects, superior to monolithic construction. During the years 1909 to 1920, a large volume of precast construction was carried out by the Unit Construction Co., which was organized around my patents covering methods of joining the units by pouring a small amount of concrete "*in situ*", in prepared joints. The files of *Engineering News* and *Engineering Record* contain descriptions of some of the work. Included were practically all types of reinforced-concrete construction in industrial plants, power houses, warehouses, roundhouses, train-sheds and snow-sheds. In the housing field, 300 two-story houses were constructed by that method.

The patents covering such construction have long since expired, but it would seem that the methods could be very well used at the present time.

JOHN CONZELMAN
Consulting Engineer
St. Louis 1, Mo.

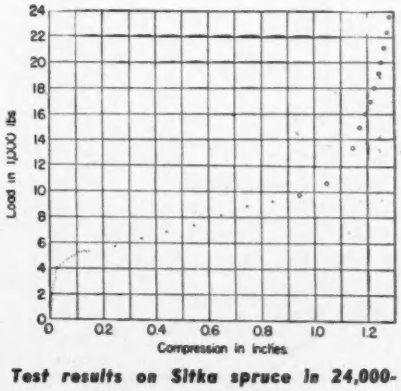
Hankinson Formula Best

Sir: In *ENR* July 12, 1945, vol. p. 120, Prof. F. C. Smith, College of Engineering, University of Washington, discussed the Hankinson formula for compression on wood at an angle to the grain. Three points seemed to need clarification: (1) reference to maximum stress in compression perpendicular to grain; (2) factor of safety or working value reduction factor; and (3) reduction factor at intermediate angles to grain. The Forest Products Laboratory at Madison, Wisconsin, after careful study, recommended the use of the Hankinson formula rather than any other, and rather than develop a new formula. The following facts are submitted after review by the laboratory:



Compression test to destruction on 2 x 2 x 6 in. Sitka spruce specimen.

(1) There is no practical maximum or ultimate strength in compression perpendicular to grain on wood. Beyond proportional limit the fibers simply compress until the intra-cellular spaces are closed and opposite cell walls meet. Real ultimate strength would be the maximum resistance of wood substance itself. Illustrations show a load deflection diagram and test at the Forest Products Laboratory. The load was distributed over 4 sq. in., and the test was made by the same method as in those reported in Army Air Service Circular 259, quoted by Prof. Smith. Proportional limit was at a load of 2,700 lb. (675 psi) and a deformation of 0.012 in. At a load of about 5,300 lb. horizontal splitting occurred in the ends of the specimen beyond the bearing plate. The load then continued to increase slowly until the deformation reached about 1 in. and the intro-cellular spaces had been closed, after which it rose rapidly to the capacity of the testing machine, 24,000 lb. In a subsequent test in a 100,000 lb. testing machine the capacity of the machine was again reached without obtaining an ultimate.



Test results on Sitka spruce in 24,000-lb. capacity machine. Similar compressive action without complete failure occurred in a 100,000-lb. machine.

(2) The term reduction factor, rather than factor of safety, is used for wood, since it is only a methematical ratio and is not the real safety factor. Working stresses recommended by the Forest Products Laboratory are based on several factors which do not appear in a mathematical division, by a working stress, of proportional limit or ultimate strength test values on small, clear, green specimens. They are based both on proportional limit and maximum strength, and on the relation between these properties, and on their relative importance. They vary also from precise computed values according to relative behavior of structural sizes as compared with small test specimens. Douglas fir behaves favorably with regard to structural sizes, so the actual factor of safety is greater than a mathematical calculation indicates.

The reduction factors which Prof. Smith used were not comparable. That of 5.5 was obtained by dividing an ultimate compression parallel value of 8,465 lb. by a 1,550 lb. working stress for a particular grade. The 2.9 reduction factor was obtained by dividing a compression perpendicular value of 1,320 lb., a value beyond the proportional strength but not a true ultimate, by a working stress of 455 lb. Further, the test values reported in Circular No. 259 are not suitable for use in such a comparison in that the specimens used were limited in number and not selected nor intended to cover the range in strength to be found in Douglas fir. The circular does not indicate whether they were high, low, or near the average strength for the species.

Basic working stresses are recommended by the Forest Products Laboratory, subject to adjustment for grade and conditions of use. The defects permitted in a grade do not materially af-

fect compression perpendicular but do adversely affect compression parallel. The relation of the reduction factors for the two properties, therefore, differs with different grades. A comparison of reduction factors for a particular grade especially when complicated by allowances for density and conditions of use does not mean much. Comparable reduction factors can be obtained by dividing proportional limit values from Table 8 of the Wood Handbook, Forest Products Laboratory, by the basic working stress from Table 20 of the same publication. Reduction factors thus obtained would for compression parallel be 3410 ÷ 1466 = 2.33 and for compression perpendicular 510 ÷ 325 = 1.57. The lower factor for compression perpendicular is justified by the fact that while under forces in compression perpendicular deflection increases with increasing load, the capacity of wood to carry load increases and no threat to the safety of structure is involved.

(3) With regard to working stresses at various angles to grain, the Forest Products Laboratory finds that the accuracy with which the formula checks with values determined experimentally at intermediate angles justifies its use with working stresses. In compression in wood at an angle to the grain the component perpendicular to grain is lateral pressure on hollow fibers, and until the fibers are fully compressed, deformation is influenced by the laterial yielding of the side walls of the fibers. Values calculated by the Hankinson formula coincide closely with test values reflecting this influence, and the Forest Products Laboratory considers that its application to working stresses gives safe values and satisfactory reduction factors.

C. J. HOGUE,
In Charge Technical Service
West Coast Lumbermen's Association
Seattle, Wash.

Pile Foundations

Sir: You are to be complimented on furnishing your readers such a clear and informative article on the design and construction of pile foundations as the one by Robert D. Chellis, *ENR* May 16, vol. p. 774.

Mr. Chellis' article describes in simple direct language the fundamental concepts of foundation engineering as applied to piling, and outlines most of the common troubles that are encountered. This article warrants reading by all who are concerned with the design and construction of proper pile foundations. For those who are not familiar with, and not constantly working in the field of applied soil mechanics, the article gives an excellent and understandable description of the principles that should be considered; for those who are constantly working in this field, the article will be helpful in clarifying and simplifying their thinking. It is a refreshing change from so many of the published articles on soil mechanics and foundation engineering, which become so involved in complex theories and mathematics that their basic significance is lost to many readers.

I would like to suggest that this article and probably the subsequent articles in the series would be of great interest to your readers if available in the form of reprints.

WILLIAM W. MOORE
Dames & Moore
San Francisco, Calif.

[The three articles are being reprinted in pamphlet form. Copies can be obtained from the Editorial Department, *Engineering News-Record*, 330 West 42nd St., New York 18, N. Y. Single copies 25c.; five or more 20c. each.]

Engineering Training

Sir: The content of an engineering curriculum has been the subject of much discussion during the past few years. The general opinion seems to be against the over specialization advocated by the Comdr. Kravath, *ENR* April 4 vol. p. 500.

The writer is of the opinion that much of the criticism of the younger engineers is due to:

a. The use of young engineers in positions for which they are ill prepared.

b. The failure of our colleges to properly emphasize fundamentals and good study habits.

c. The failure of some of our teachers to recognize the difference between lecturing and paraphrazing the text material.

Many years ago I had a course in highways under Professor Conwell at Cornell University in which I was exposed to construction methods and equipment. I recall that the professor found considerable time in the standard course to describe and illustrate with slides, methods of construction and construction equipment. I do not recall the professor spending much time in paraphrazing text material and would recommend his methods.

A. A. K. BOOTH
E. Smithfield, Pa.

Prestressed Concrete Tank

Sir: In *ENR* May 30, 1946, v. p. 80, R. D. Karr refers to certain problems of design as applied to the 4¾-million gallon concrete water tank at Great Falls, Montana. This tank has been in service almost one year, with temperatures ranging from 90 deg. F. above to 30 deg. F. below zero, and no evidence of any crack or leak has appeared.

It is true that in designing the vertical prestressed steel, the shortening of the wall section in compression must be considered, as well as the elongation of the bars in tension, and this was, in fact, done in the design.

The suggestion that the wall be tied to the floor by means of the vertical steel extended would lead to difficulties because of temperature stresses. These would be particularly bad if the tank were taken out of service and allowed to stand empty for any length of time, a procedure very inadvisable but always a possibility. In that case, the walls might easily become twenty or thirty degrees warmer than the floor slab, and a point would be reached where the outward thrust of the walls on the floor exceeds the friction at that joint, and the wall would slide outward on its base. This condition actually did occur on a smaller concrete tank at a local army airbase, necessitating recaulking the joint. This was a simple job compared to repairing ruptured concrete, which might have occurred had the joint not been free to slide.

Turnbuckles have a number of disadvantages, including wasting space as Mr. Karr points out. The system of winding wire around the tank at a very high tension appears to be a definite improvement in this respect. Unfortunately, this system is tied up by patents, and because the patent holder was not the low bidder on this job, the method was not available to us.

Ice does not appear to be a problem in this tank.

WILLIAM J. WENZEL
Chief Engineer
Corwin & Co., Inc.
Great Falls, Mont.

UNIT PRICES BID BY CONTRACTORS

Sanitary Sewer Extensions, Hoisington, Kansas

OWNER: Hoisington, Kansas, Wilson & Co., Engineers, Salina, Kansas.

PROJECT: Sanitary sewer extensions, 8300 lin.ft. of 8 in. vitrified clay pipe, and concrete cylindrical pumping station, 14 ft. in diameter and 8 ft. high with 20 ft. pump pit of which ⅓ will be wet well and ⅔ dry pit.

CONDITIONS: There are no existing water and gas mains to obstruct sewer extensions. Dry earth excavation, no sand, rock, or water in trenching. Completion time, 100 days after receipt of material. Range of wages is $1.25 to $1.75 for skilled labor, $0.90 to $1.25 for semi-skilled labor, and $0.65 to $0.90 for common labor.

BIDS: Eight bids were received May 3, 1946, ranging from $22,766.80 to $36,543.30. The low bid is 6.2 percent below the engineers' estimate of $24,270.00.

LIST OF BIDDERS:

1. H. L. Matthews Const. Co., Dodge City, Kans. $22,766.80
2. L. F. Harper, Great Bend, Kans. 27,601.60
3. Mahan, McCarty, & Beese, Inc., Tulsa, Okla. 27,859.23
4. Burt & Binford, Contractors, Hutchinson, Kans. 29,564.20
5. P. P. Young Const. Co., St. Joseph, Mo. 30,844.31
6. Rhoades Const. Co., Newton, Kans. 32,876.38
7. Cement Asphalt Prod. Co., Winfield, Kan. 34,862.30
8. Ammerman & Dace, Wichita, Kans. 36,543.30

Item	Quantity	Engineers' Estimate	Unit Prices (1)	Unit Prices (2)
1. Trench and backfill, 0'–6'	922 lin. ft.	0.30	0.35	0.25
2. Trench and backfill, 6'–8'	1,500 lin. ft.	0.40	0.50	0.25
3. Trench and backfill, 8'–10'	2,900 lin. ft.	0.50	0.60	0.30
4. Trench and backfill, 10'–12'	1,900 lin. ft.	0.70	0.80	0.34
5. Trench and backfill, 12'–14'	600 lin. ft.	0.90	1.00	0.36
6. Trench and backfill, 14'–16'	300 lin. ft.	1.30	1.20	0.38
7. Trench and backfill, 16'–18'	200 lin. ft.	2.00	1.50	0.40
8. 8-inch V. C. pipeline	8,019 lin. ft.	0.80	0.80	1.15
9. 8-inch C. I. pipeline	303 lin. ft.	2.80	3.30	3.75
10. 6-inch V. C. pipe risers	36 lin. ft.	0.50	0.50	2.00
11. 8" x 6" V. C. wyes	200 each	1.50	1.00	3.00
12. 6-inch V. C. 1/8 bends	100 each	1.10	1.00	2.50
13. Std. manholes, 6 feet deep	21 each	100.00	80.00	125.00
14. Drop manholes, 6 feet deep	3 each	115.60	90.00	150.00
15. Extra manhole depth	88 lin. ft.	10.00	8.00	15.00
16. Remove and replace pavement	13 sq. yd.	5.00	4.00	5.00
17. Remove and replace bit. surface	110 sq. yd.	3.00	2.00	3.00
18. Pumping station, complete	1 Lump Sum	7,870.00	6,515.00	9,000.00

Guide Walls, Landward Lock, Hastings, Minn.

OWNER: U. S. Engineers, Maj. H. J. Manger, District Engineer, St. Paul, Minn.

PROJECT: Guide Walls, Landward Lock, Lock and Dam No. 2, Mississippi River, Hastings, Minn., 920 and 500 ft. in length.

CONDITIONS: Owner will furnish 1, Poiree Trestles, including needles and parts for one poiree dam; 2, Bulkheads, steel for Tainter valve recesses, 2 sets; 3, paint, including vehicle, pigments and thinner. Completion time, 300 days after notice to proceed. Transportation by rail, C.M. & St. P.P. & C.B.Q.R.R., by highway, access road from Hastings, by water, Inland Waterway System. Wages range from skilled rates for bricklayers, $1.825; structural iron workers, $1.75; reinforcing ironworkers, $1.625; carpenters, $1.50; to unskilled laborers, $1.01. Power equipment operator's rates range from shovel and dragline operators at $1.85 to service truck drivers at $0.90.

BIDS: Four bids were received March 8, 1946 at St. Paul, Minn., ranging from the contract low of $637,755.50 to $1,180,480.00. The contract price is 14.5 percent above the government estimate of $556,608.30.

LIST OF BIDDERS:

1. United Constr. Co., Winona, Minn. (contract) ... $637,755.50
2. Al Johnson Constr. Co., Minneapolis, Minn. 795,015.50
3. LaCrosse Dredging Corp., Chicago, Ill. 831,513.00
4. Spencer, White & Prentis, Inc., New York, N. Y. 1,180,480.00

Item	Quantity	Government Estimate	Unit Prices (1)	Unit Prices (2)
1. Cofferdam; upper guide wall	sum job	$40,000.00	$53,631.28	$188,655.00
2. Cofferdam; lower guide wall	sum job	20,000.00	35,787.02	111,164.00
3. Excavation	63,400 cu. yd.	0.30	0.66	0.60
4. Backfill	15,300 cu. yd.	0.33	0.21	0.72
5. Fill	7,300 cu. yd.	0.59	0.10	0.71
6. Piling; round timber, vertical	50,700 lin. ft.	0.85	1.53	1.02
7. Piling; round timber, batter	22,600 lin. ft.	0.90	1.66	1.02
8. Piling; steel sheet, cutoff wall	9,820 sq. ft.	1.65	2.33	1.80
9. Piling; steel sheet, buffer cells	5,250 sq. ft.	1.80	1.78	1.65
10. Protection stone; derrick	120 cu. yd.	12.00	5.00	32.00
10.A Protection stone, riprap	200 cu. yd.	7.00	3.50	13.75
10B. Protection stone; gravel	85 cu. yd.	4.35	3.00	6.40
11. Gravel surfacing	195 cu. yd.	4.35	3.00	2.60
12. Cement (for concrete)	18,220 bbl.	2.97	2.75	2.60
13. Concrete; class A	15 cu. yd.	33.00	75.00	169.80
13A. Concrete; class B	17,900 cu. yd.	16.00	14.71	13.85
14. Steel; structural	56,200 lb.	0.15	0.25	0.15
15. Steel; misc.	1,450 lb.	0.15	0.25	0.21
16. Steel; concr. reinf.	5,800 lb.	0.10	0.10	0.08
17. Castings; steel	9,100 lb.	0.25	0.36	0.28
18. Castings; iron	5,000 lb.	0.35	0.27	0.39
19. Handrailing	2,800 lin. ft.	2.50	2.75	2.42
20. Conduit; asbestos-cement, 3"	1,380 lin. ft.	0.58	1.00	0.90
21. Conduit; asbestos-cement, 2"	4,200 lin. ft.	0.43	0.80	0.74
22. Conduit; rigid metal, 3"	50 lin. ft.	0.95	4.90	4.65
22A. Conduit; rigid metal, 2"	130 lin. ft.	0.55	3.50	3.15
23. Install.; Poiree Dam & bulkheads	sum job	2,100.00	2,000.00	2,842.00
24. Stage record house, compl.	2 each	1,050.00	1,000.00	1,624.00
25 Fenders; complete assembly	sum job	1,000.00	800.00	730.00
26. Painting (except items 24 & 25)	sum job	6,000.00	1,000.00	2,098.00

Merriman Dam, New York

OWNER: City of New York, N. Y., Board of Water Supply, Roger W. Armstrong, chief engineer.

PROJECT: Completion of Merriman Dam (Formerly Lackawack) of Delaware Aqueduct system and effluent chamber for the Rondout reservoir together with its superstructure, waste weir and waste channel and appurtenances.

CONDITIONS: Suitable earth for embankment is available nearby, owner is furnishing some material, equipment for aggregate production and for work at the effluent chamber, taken over from previous contractor. For the 1946 bidding, rolled embankment was separated into two types, Class A, for the core, subject to more exacting moisture control and rolling than Class B, the outer embankment. Time for completion, 45 consecutive calendar months compared to 52 for the 1945 bidding, and to 72 months for the original contract. Skilled wages for general construction on project range from $2.25 per hour for hoisting engineers to $1.25 for waterproofers and painters and $1.125 for sheet metal workers;

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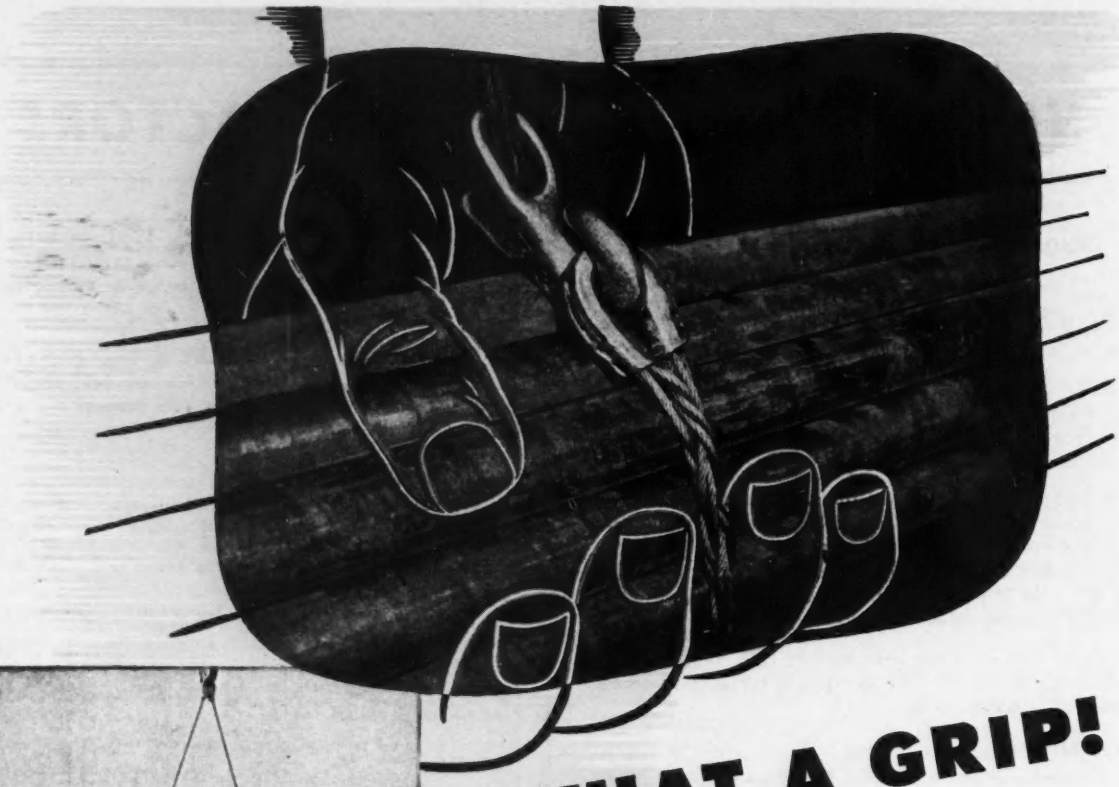


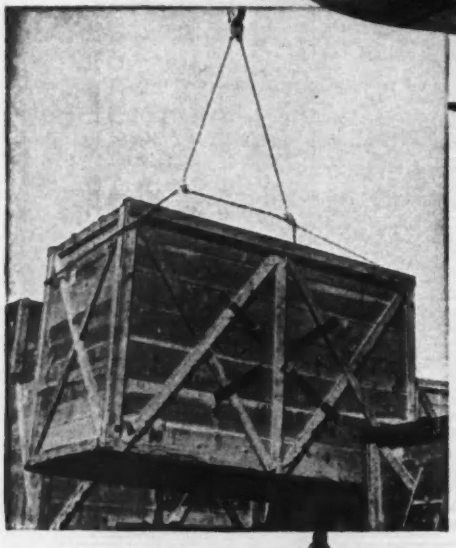
WHAT A GRIP!

Handle loads safely... economically with YELLOW STRAND *BRAIDED* SLINGS*

A lot of industries have taken a fresh hold on the sling question as a result of war production. And what a grip they get by using the adaptable Yellow Strand *Braided* Safety Sling! After handling just about every extreme in lifts — from multi-ton ship sections, tanks and guns to light-weight parts, jigs and crates — this improved type of sling is today primed to speed *your* assembly line shop or field operations.

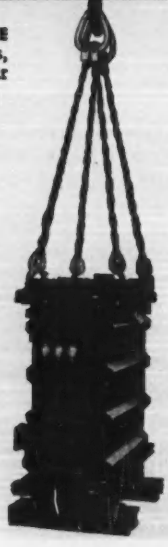
Tough Yellow Strand Wire Rope provides the sling's strength. The patented *braiding* adds flexibility, kink-resistance and a snug grasp on odd-shaped, rounded or slippery objects. The combined result is a time-and-labor-saving sling with less weight and bulk than chain of like capacity... with limberness well suited to former Manila rope jobs... with security that safeguards both employees and loads.

Properly fitted, Yellow Strand *Braided* Slings will give long-lived, economical service. Send details of your application now and let B&B engineers offer a recommendation. Broderick & Bascom Rope Co., St. Louis 15, Mo. *Branches:* New York, Chicago, Houston, Portland, Seattle. *Factories:* St. Louis, Seattle, Peoria.



RIGGERS' HAND BOOK FREE
Shows sling types, fittings, capacities. Write for your copy.

*PATENTS: U. S., 1475839, 1934471, 2142041, 2402582, 3298108; CANADA, 312978, 210008



BRODERICK & BASCOM
Yellow Strand
BRAIDED SAFETY* SLINGS

Merriman Dam, New York

Continued from preceding page

semi-skilled from $1.65 for some machine operators to 75 cents for helpers and laborers, 70 cents for powder watchman.

RECORD OF BIDS: Three bids were opened February 26, 1946, ranging from $14,300,800 to $16,767,400. Contract was awarded to the low bidder, S. A. Healy. This low bid is an increase over the September, 1945 low bid of approximately 2.7 percent. The *Engineering News-Record* Construction Cost Index rose 3.3 percent in this same period.

LIST OF BIDDERS, Feb. 26, 1946:

1. S. A. Healy Co., White Plains, N. Y. and Chicago $14,300,800
2. Johnson, Drake & Piper, Inc., Foley Bros., S. J. Groves & Sons Co., Jay L. McLaughlin 16,711,800
3. Del Balso Constr. Corp., and Rusciano & Son Corp., N. Y. 16,767,400

Five bids opened Sept. 11, 1945, ranging from $13,919,950 to $19,121,050, were rejected Sept. 18, 1945.

LOW BIDDERS, 1945:

I. S. A. Healy Co., White Plains, N. Y. and Chicago $13,919,950
II. Del Balso Constr. Corp. and Rusciano & Son Corp., N. Y. 14,602,000
III. Johnson, Drake & Piper, Inc., Foley Bros., S. J. Groves & Sons Co., Jay L. McLaughlin 16,462,150

On the original contract, five bids were opened July 25, 1939, ranging from $15,486,150 to $22,134,000. Contract awarded Aug. 16, 1939.

LOW BIDDERS, 1939:

A. Mason & Hanger Co., Inc., New York (contract) $15,486,150
B. Jahn-Bressi-Bevanda Constructors, Inc., Los Angeles, Calif. 16,195,700
C. Keystone Company, San Francisco, Calif. 16,720,150

Under the original contract a caisson cut-off wall, shaft, tunnel and a large quantity of rock excavation was completed and $7,425,000 paid.

COMPARISON OF 1939, 1945 AND 1946, BIDS ON MERRIMAN DAM

	Item	Quantity	1946 Bids No. 1		No. 2	No. 3	1945 Low Bid‡ Rejected No. 1		Quantity	Comparable Items 1939 Contract†‡ A	
1	Stream control	L. S.	$35,000.00	$35,000	$150,000.00	$100,000.00	$30,000.00	$20,000	L. S.	$20,000.00	$20,000
2	Borings	20,000 l. f.	6.25	125,000	4.70	6.00	8.00	160,000	30,000 l. f.	5.00	150,000
3	Removal of buildings	48,000 s. f.	.35	16,800	.15	.25	.20	9,600	40,000 s. f.	.20	8,000
4	Removal of soil	10,000 c. y.	.35	3,500	.50	1.00	.40	4,000	160,000 c. y.	.50	80,000
5	Earth excavation	400,000 c. y.	.95	380,000	.75	1.00	.75	300,000	1,220,000 c. y.	.35	427,000
6	Rock excavation	160,000 c. y.	3.00	480,000	5.00	5.00	4.00	640,000	410,000 c. y.	2.20	902,000
7	Prepare rock surfaces	4,000 s. y.	3.00	12,000	4.00	8.00	10.00	40,000	5,500 s. y.	8.00	44,000
8a	Rolled embankment, Class A	1,500,000 c. y.	1.04	1,560,000	1.37	1.35			5,600,000 c. y.	.48	2,688,000
8b	Rolled embankment, Class B	4,100,000 c. y.	.94	3,854,000	1.13	1.26	.93	5,208,000			
9	Refilling and embanking	520,000 c. y.	.45	234,000	.60	.50	.50	260,000	1,250,000 c. y.	.10	125,000
10	Rock embankment	750,000 c. y.	.60	450,000	.60	1.25	.55	412,500	1,000,000 c. y.	.45	450,000
11	Surface dress and grass	210,000 c. y.	1.50	315,000	1.50	2.00	2.00	420,000	170,000 c. y.	.60	102,000
12	Timber and lumber	120 M bm.	250.00	30,000	180.00	200.00	200.00	24,000	300 M bm.	135.00	40,500
13	Conc. masonry, open cut	70,000 c. y.	20.00	1,400,000	30.00	20.00	20.00	1,400,000	145,000 c. y.	14.00	2,030,000
14	Conc. masonry, tunnels	7,500 c. y.	25.00	187,500	40.00	30.00	39.00	292,500	48,000 c. y.	8.00	384,000
15	Dry rubble masonry, paving	55,000 c. y.	17.50	962,500	15.00	15.00	13.00	715,000	60,000 c. y.	3.50	210,000
16	Stone paving in mortar	12,000 c. y.	20.75	249,000	20.00	18.00	16.00	192,000	11,000 c. y.	5.40	59,400
17	Stone masonry in mortar	9,000 c. y.	23.00	207,000	22.50	20.00	22.00	198,000	27,000 c. y.	13.00	351,000
18	Stone facing in mortar	13,000 c. y.	45.00	585,000	40.00	40.00	33.00	429,000			
19	Furnishing granite facing, coping*	30 c. y.	175.00	5,250	150.00	200.00	300.00	9,000	3,500 c. y.*	100.00	350,000
20	Place granite facing, coping*	4,400 c. y.	85.00	374,000	80.00	80.00	100.00	440,000			
21	Brick facing masonry	420 c. y.	115.00	48,300	80.00	80.00	125.00	52,500	550 c. y.	36.00	19,800
22	Brick backing masonry	600 c. y.	60.00	36,000	50.00	60.00	60.00	36,000			
23	Concrete roof tiles	1,500 s. y.	37.50	56,250	20.00	20.00	30.00	45,000	1,450 s. y.	14.00	20,300
24	Granolithic finish	1,200 s. y.	4.75	5,700	3.00	2.00	2.00	2,400	850 s. y.	1.00	850
25	Protec. coating cem. mortar	1,000 c. y.	22.50	22,500	20.00	25.00	20.00	20,000	2,000 c. y.	25.00	50,000
26	Drill, holes, rock or masonry	7,000 l. f.	1.25	8,750	1.50	2.00	1.50	10,500	50,000 l. f.	1.00	50,000
27	Steel pipes for grouting	11,000 l. f.	1.00	11,000	1.00	1.00	1.50	16,500	30,000 l. f.	.80	24,000
28	Connections for grouting	600 ea.	3.00	1,800	4.00	5.00	4.00	2,400	4,000 ea.	3.00	12,000
29	Mix. and place. grout	5,000 c. y.	13.50	67,500	18.00	20.00	20.00	100,000	25,000 c. y.	14.00	350,000
30	Concrete pavement	700 c. y.	7.50	5,250	10.00	10.00	8.00	5,600	1,000 c. y.	6.50	6,500
31	Bit. macadam pavement	3,500 c. y.	3.50	12,250	6.00	7.00	7.00	24,500	3,300 c. y.	6.00	19,800
32	Bituminous material	47,000 gal.	.15	7,050	.15	.20	.15	7,050	55,000 gal.	.09	4,950
33	Granite curb	1,000 l. f.	7.00	7,000	5.00	7.00	8.00	8,000	1,300 l. f.	4.00	5,200
34	Portland cement	210,000 bbl.	3.75	787,500	3.00	3.00	4.00	840,000	570,000 bbl.	2.20	1,254,000
35	Cr. stone and gravel	4,000 c. y.	3.00	12,000	5.00	5.00	3.50	14,000	5,200 c. y.	3.00	15,600
36	Sand for filters, grout, etc	1,700 c. y.	3.00	5,100	3.00	5.00	4.00	6,800	6,000 c. y.	4.00	24,000
37	Vit. and asb.-cement pipes	28,000 l. f.a	1.00	28,000	1.65	1.50	2.00	54,000a	10,000 l. f.	1.50	15,000
38	Reinforced-concrete pipes	3,000 l. f.	5.00	15,000	5.00	5.00	6.00	18,000			
39	Steel for reinforcing concrete	4,000,000 lb.	.08	320,000	.08	.08	.07	280,000	6,000,000 lb.	.055	330,000
40	Structural steel	1,100,000 lb.	.10	110,000	.08	.10	.08	88,000	1,850,000 lb.	.07	129,500
41	Steel interlining	1,170,000 lb.	.12	140,400	.12	.10	.09	105,300	1,130,000 lb.	.09	101,700
42	High-str. iron castings	37,000 lb.	.20	7,400	.25	.30	.20	7,400	285,000 lb.	.10	28,500
43	Cast-iron pipes and fittings	42,000 lb.	.15	6,300	.20	.20	.15	6,300	83,000 lb.	.10	8,300
44	Misc. c. i., w. i., steel	1,100,000 lb.	.30	330,000	.24	.25	.15	165,000	2,200,000 lb.	.12	264,000
45	Galvanising	540,000 lb.	.07	37,800	.05	.05	.06	32,400	650,000 lb.	.03	19,500
46	Aluminum doors, sashes, frames	50,000 lb.	1.60	80,000	2.00	1.50	2.00	100,000	48,000 lb.	1.00	48,000
47	Alum. gratings, ladders, stairs, etc.**	52,000 lb.	1.15	59,800	1.25	1.50	1.00	52,000	135,000 lb.**	.20	27,000
48	Misc. bronze, copper, etc	48,000 lb.	1.00	48,000	1.00	1.00	1.00	48,000	75,000 lb.	.80	60,000
49	Inst. and test. equip. and metal furn. by city	2,900,000 lb.	.065	188,500	.10	.07	.07	203,000	2,000,000 lb.	.04	80,000
50	Painting	110,000 s. f.	.06	6,600	.05	.10	.07	7,700	250,000 s. f.	.03	7,500
51	Chlorination, per month	500 mo.	275.00	137,500	200.00	200.00	300.00	150,000			
52	Liquid chlorine	600,000 lb.	.06	36,000	.05	.10	.08	48,000	50,000 lb.	.10	5,000
53	Sanitary services	L. S.	130,000.00	130,000	400,000.00	200,000.00	125,000.00	125,000	L. S.	75,000.00	75,000
54	Passenger elevator	L. S.	25,000.00	25,000	26,000.00	50,000.00	25,000.00	25,000			
55	Cleaning up	L. S.	35,000.00	35,000	100,000.00	25,000.00	30,000.00	30,000	L. S.	10,000.00	10,000

* Original contract specified sandstone or bluestone. ** Original contract specified wrought iron. † For complete tabulation see ENR June 20, 1940, p. 160. ‡ For 2nd and 3rd low bids see ENR September 27, 1945, p. 401. a 27,000 l. f. in 1945 Bids.

New Aids to the Constructor

MANUFACTURERS' LATEST DEVELOPMENTS IN EQUIPMENT AND MATERIALS

All-Welded Concrete Handler

A new construction tool, Dumpcrete, for transporting air-entrained concrete from a central mixing plant to the job site, is built of all-welded high tensile steel, with important weight-saving features. Concrete may be discharged as high as 6 ft. 3 in. from ground level, and the hydraulic hoisting mechanism provides a dumping angle of 90 deg. Rounded corners and interior welds ground smooth facilitate clean, fast discharge. Dumpcrete Models 2C and 4C have respective rated capacities of 2 and 4 cu.yd. and struck volumes of 3.5 and 6.25 yd. An adjustable baffle, deflector plates and inverted center keel provide a discharge similar to that of a bottom-dump bucket. Standard equipment includes a specially designed gage, directional discharge hopper and two sections of chute.—*Maxon Construction Co., Dayton 2, Ohio.*

Anion-Exchange Resin

Useful in the fields of water-conditioning and removal or recovery of acid, improved Amberlite 1R-4B resin is said to produce deionized water comparable to distilled water. This resin has outstanding resistance to the leaching action of water and to the aggressive action of formaldehyde and formic acid.

Other advantages of this product, which is shipped in "freebase" or regenerated form, are absence of objectionable color-throwing, lower rinse requirements and reduced packing.—*Resinous Products & Chemical Co., Philadelphia, Pa.*

• • •

Portable Ventilator

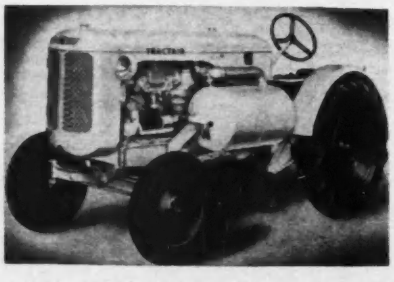
Useful for ventilating tunnels, manholes, and storage tanks as well as providing personnel comfort, the "Self-Powered" ventilator consists of a high capacity fan, a gasoline engine or electric motor, and a wire cage containing a collapsible 14 in. dia. by 16 ft. length directional air duct. The 87-lb. ventilator is mounted on a light tubular metal frame with two rubber-tired wheels.

Air delivery is adjustable up to 4,500 cfm.—*The Herman Nelson Corp., Moline, Ill.*

• • •

Portable Air Compressor

Latest addition to LeRoi's line of portable air compressors is "Tractair," a 105 cfm. air compressor combined as an integral part of a 35 hp. tractor. The 6-cylinder air-power unit is new, and the



cylinder block is one casting with hardened removable wet cylinder sleeves and precision shell-type bearings.

The Le-Roi-Centaur tractor unit, on four pneumatic tires, has 5-speed transmission. Engine power surplus is sufficient to maintain a full head of compressed air.—*LeRoi Co., Milwaukee, Wis.*

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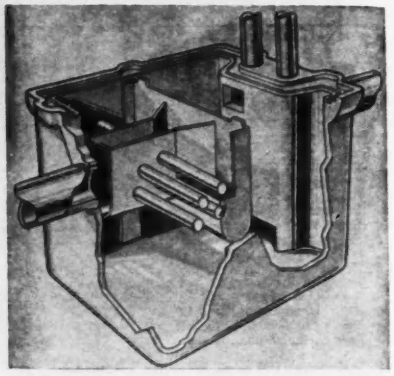
Grease Interceptor

A new principle, filtering *of* grease *by* grease, is incorporated in HydraFilter, a double-acting grease interceptor, in addition to gravity differential separation. This filter is said to be highly efficient in



grease salvage, and to permit the selective handling of all solids.

Some features of the HydraFilter are: 90 to 95 percent operating efficiency; optional horizontal and vertical vent connections; lightweight aluminum cover; special hand fasteners. This interceptor is available in a complete range of sizes.—*Wade Manufacturing Co., Elgin, Ill.*

• • •

Waterproofing Compound

Kay-tite, a waterproofing compound for use with masonry-block construction, may be applied like paint to interior or exterior walls. Brushed thoroughly in and over masonry surfaces which have first been made soaking wet, Kay-tite will sink in deeply, expand and set with extreme hardness.

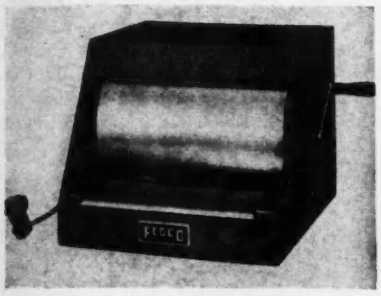
This compound, in gray or white, forms an attractive outside painted surface that is washable, smooth and grime-resisting.—*Kay-tite, West Orange, N. J.*

• • •

Print Dryer

An exclusive feature of the Fedco drum dryer is a continuous single belt, made of duck, preshrunk, and held automatically to prevent sideslip. It occupies bench space only 18 in. square and 15 in. high, and its heating system uses only 300

watts. An electrical element on the inside surface of the drum gives even heat distribution, and a new device enables



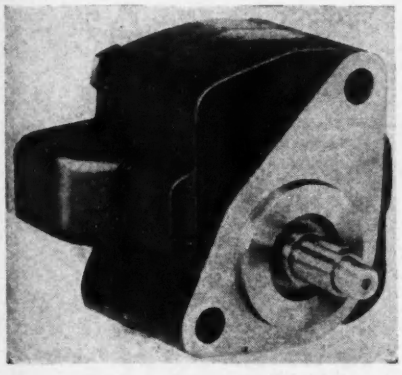
current to reach the heating element without slip-rings.

Two models of the dryer are available, for hand or motor drive; the latter is said to dry as many as 120 9x11 or 90 11x14 photostats per hour. It may be used on 115 volts, AC or DC.—*Fedco Products Co., 37 Murray St., New York, N. Y.*

• • •

Hydraulic Pump

Suitable for use with hydraulic systems from 100 to 2,000 psi., in tractor, bulldozer, road machinery control, etc., the gear-type Model H657-A hydraulic pump is said to be highly efficient. Nitroalloy



gears are used in a cast iron body of "sandwich" design which provides ample porting to standard pipe sizes and mounting flange adaptable to users' equipment.

The unit is approximately a 3½-in. cube, with ½ in. dia. x 11/16 in. drive shaft extension, plus threaded portion for ⅜ in. nut.—*The Aro Equipment Corp., Bryan, Ohio.*

• • •

Tractor-Shovel

Up-to-date in design, but retaining all former basic operating and performance features, the Model IT4 Traxcavator is mounted on and powered by a Caterpillar Model D4 track-type tractor. The 1 cu. yd. bucket is wider than the tractor tracks so that it trims close to curbs, walls and corners of excavations. In addition to the bulldozer blade, quickly installed in place of the bucket, an Anglegrader and other attachments are available. The tractor

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It is your responsibility to control the air content of the concrete.

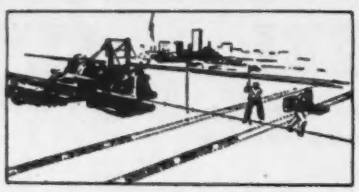
Read the new "specs" on the amount of air that must be entrained, and then use Darex AEA as a gauge-water addition. You can meet the specifications and keep the control of the air content in your hands. It's the only way you can compensate for changes occurring in the field.

Darex AEA costs only a few cents per yard. It is safe, harmless. Comes ready to use. Darex Air Entraining Concretes save you time and labor because they are plastic, workable, reduce segregation and bleeding, speed up finishing, give durable concrete. — DEWEY AND ALMY CHEMICAL COMPANY, Cambridge 40, Massachusetts.

Use Darex AEA with Confidence

Measuring meters available

Simple metering devices for Darex AEA are available. Write for details.



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BURIED PIPE AND CABLE FINDER

16 PAGE BOOKLET FREE UPON REQUEST

FISHER RESEARCH LABORATORY

Palo Alto, California

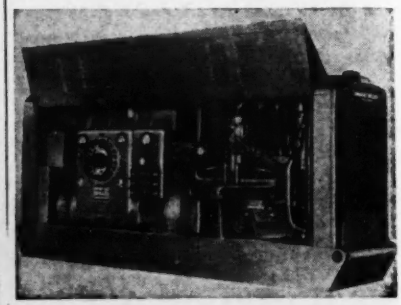
drawbar is always free for hauling work.

Model IT4 has a fast mechanical hoist, driven from the front power take-off of the tractor through a reliable V-belt drive. Bucket can be dumped from any point of the lift; it has a digging range from 14 in. below to 56 in. above track line and tilts back 30 deg. during the first part of the lift, which minimizes spillage.—*Trackson Company, Milwaukee 1, Wis.*

• • •

Gasoline-Driven Arc Welder

An inbuilt A-C generator is a feature of a new 300-ampere gasoline-driven arc welder, which also makes use of a Hobart oversize separate exciter to supply excitation to both the welding and the A-C generators. By means of a special arrangement to connect stations and panel, four combinations of power may be furnished simultaneously. The panel provides receptacles and studs for connecting to the power required. The auxiliary A-C generator is made in 6 and 12 kw. sizes.—*The Hobart Brothers Co., Hobart Square, Troy, Ohio.*



• • •

Drafting Stencils

Three-dimensional drawings are said to be simplified with "Instrumaster" stencil-type drafting instruments, for isometric and dimetric drawings. Cut out of clear plastic stock .040 in. gage, each stencil has 27 ellipse openings, representing circles from ⅛ in. to 2 in. dia., with allowance for thickness of pencil point or lettering pen. For positioning the ellipses correctly their center lines are marked by lines and small holes.—*Instrumaster Industries, 7341 Arch St., Greenwich, Conn.*

• • •

Shape-Cutting Machine

Designed to do precision cutting on work of intermediate size, formerly done with a large machine, the CM-15-36 oxy-acetylene shape-cutting machine has an attachment for mounting the blowpipes on both sides of the tracing table. This feature permits cutting of identical shapes simultaneously from plates on both sides of the table, and tends to eliminate "down time".

All types of shape cutting may be

partners in creating

Many brilliant projects have been started with a K & E Slide Rule and the back of an old envelope. But between a new conception and its practical execution of the vital links are always the engineer and the draftsman. For through their techniques they construct the project on paper with unmistakable clarity and precision. In this their drafting instruments and equipment become part of their own hand and brain, and their partners in creating.

For 78 years Keuffel & Esser Co. Slide Rules, drafting equipment and materials have been partners in creating the greatness of America, in making possible our nationwide railway system, giant airports, fine radios for nearly every home . . . So universally is K & E equipment used, it is self-evident that every engineering project of any magnitude has been completed with the help of K & E. Could you wish any surer guidance than this in the selection of your own "engineering partners"?

In slide rules especially, you will find K & E precision invaluable. For it not only brings you a slide rule that is a joy to use, but it adds to your confidence in making every calculation. You will find Don Herold's booklet, "How To Choose A Slide Rule", amusing and very helpful. Write on your letterhead to Keuffel & Esser Co., Hoboken, N. J.

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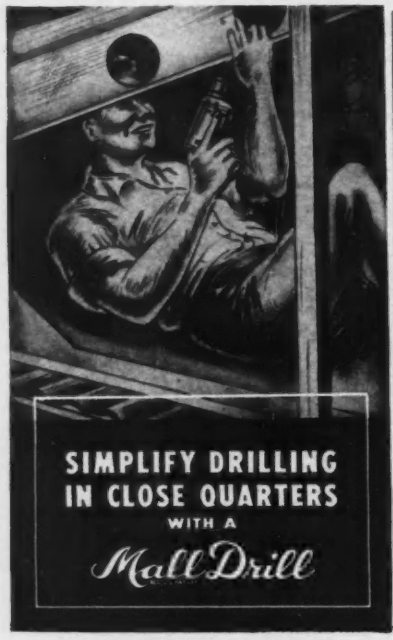
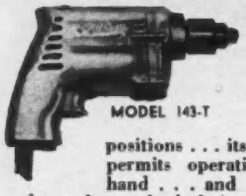




● The compact design of the ¼" MallDrill makes it easy to handle in close quarters and cramped positions . . . its perfect balance permits operation with either hand . . . and its light weight reduces the worker's fatigue when drilling at difficult angles.

Equally efficient on metal, wood or plastic, the MallDrill is designed for constant duty. Its powerful high speed motor is cool running and will not stall in hand drilling. Special steel alloy gears, and extra long brushes make for long service. The commutator is easily accessible for cleaning and inspection and the brushes can be replaced without dismantling the drill.

The ¼" MallDrill comes in 2 speeds—Model 143-T 2500 r.p.m.—Model 143-TP 1800 r.p.m. Available for 110-volt AC-DC or 220-volt AC-DC.

● The ½" MallDrill is tailor-made for heavy duty drilling. It has a ½" capacity in metal and 1" capacity in wood. It is equipped with powerful ballbearing motor, steel alloy helical gears and the finest chucks. Its streamlined appearance is designed for peak efficiency and service. Has free speed of 500 r.p.m.; available for 110 volt AC-DC or 220-volt AC-DC. Also 5/16" and ⅜" models.

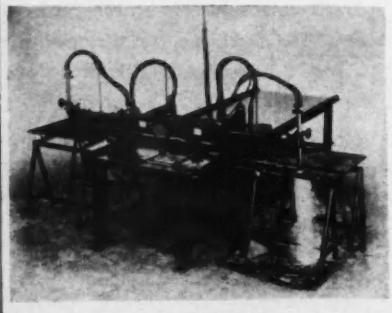
Ask your Distributor or write for catalog on MallDrills, MallSaws, Mall Concrete Vibrators and Mall Chain Saws.

Mall Tool Company

7730 South Chicago Ave.
CHICAGO 19, ILL.

★ *25 Years of*
"Better Tools For Better Work"

done by this machine within its 36-in. transverse working range. The longitudinal working range of 100 inches with the standard table can be extended by adding frame and table top sections.

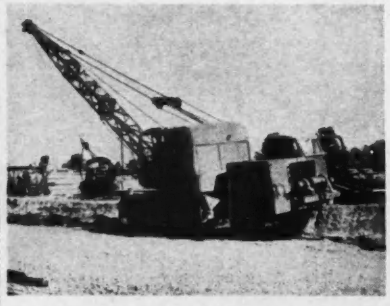


The carriage of CM-15-36 is of cast aluminum, with two free-moving pivoted arms. The tracing head is powered by a 110-volt universal motor.—*Linde Air Products Co., 30 East 42nd St., New York, N. Y.*

• • •

Motor Crane

A 6-wheel drive Moto-Crane, offered commercially for the first time, is a heavy duty, 20-ton capacity crane developed for use in military service. The crane has double reduction drive on all axles, eight speeds forward and two reverse, and will



travel up to 31 miles per hour. Steering is air power assisted and air brakes are installed on all six wheels.

Hoist, swing, travel and boom derricking may be effected simultaneously. The unit is convertible to shovel, crane, dragline, clamshell or backdigger.—*The Thew Shovel Co., Lorain, Ohio.*

• • • •

Dual Drum Paver

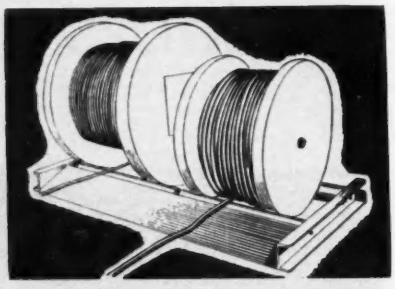
After exhaustive field tests the Multi-Foote Duomix, a 34-E dual drum paver which incorporates many new features, has been announced. Fully automatic control is reported to cut down charging, transfer and discharging time to a minimum.

On one pilot test which involved paving of a six-mile reconstruction project, the paver turned out 10 percent oversize batches (37.4 cu. ft.) every 35 seconds. Whenever enough batch trucks were available, runs ranging from 60 to 80 batches an hour were made despite the necessity of moving the paver back and forth in order to put on a final three-inch top course after placing reinforcement.—*Foote Company, Inc., Nunda, N. Y.*

• • •

Reel Roller

There is no wrong side to Roll-A-Reel, a new light-weight stand, and wire and cable can be easily removed from top, bottom, front or back. A simple, positive roller lock enables the reel to be quickly removed from the stand, which has all sharp corners rounded off and which remains upright in any position on all edges. Six adjustable slots permit the use of numerous reel sizes, and ball-bear-



ing rollers provide frictionless rolling.

Roll-A-Reel, of reddish orange color, comes in two sizes: Style A for single reels up to 28 in. wide or 2,000 lb. in weight, with one roller lock; Style B, for two reels up to 24 in. wide or one 48 in., with two locks, one for each front roller.—*Roll-A-Reel, 327 West 4th St., Cincinnati 2, Ohio.*

• • •

Midget Life Saver

Less bulky and warm than a life vest, a new life belt has wide application in the construction field—on harbor work, pier and bridge construction, dredges, or any jobs over water.

Light in weight and not much more bulky than a trousers belt, the new life saver is said to act quickly. When the wearer falls overboard he merely squeezes the side of the belt, puncturing two small cylinders of gas that inflate the belt to instant buoyancy. If pressure should drop off, the belt can be inflated by mouth.—*Air Cruisers, Inc., Clifton, N. J.*

• • •

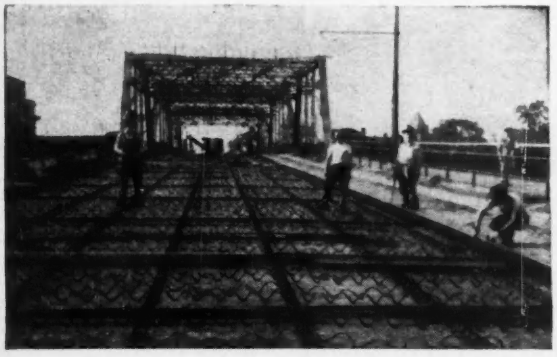
Dynamometer

The Dillon Tens-O-Trol, an electric remote tension and weight indicator, is said to be most useful wherever loads must be weighed. In crane and boom work, the operator, on the ground, can read exact weight as the load is lifted, thus preventing overloading.

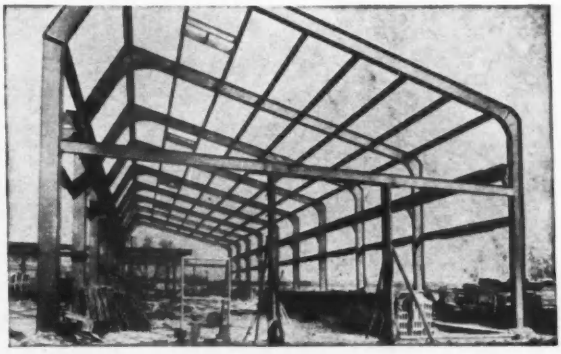
The Tens-O-Trol repeater station measures 12x14x5 in., with an illuminated

LOOK, MR. LAGUARDIA, **how engineers and contractors are stepping out in front with the world's leading electrode—**

"Cooking" with *Fleetweld*...



Boosting capacity 100%. Flooring of this 53-year old bridge at Scranton, Pa., was strengthened by welding floor buckle plates to stringers and reinforcing with spirals of ⅝" and ½" round bars, each loop welded to floor plates. Former load limit was 6 to 8 tons. Now 15 tons. Eliminates former vibration. "Fleetweld 7", ¼" size with 300 amps., speeded the job.



Creating better structures. Improvements, such as this rigid frame structure, are made possible by arc welding. Cuts tonnage 15% to 25%. Maximum use of shop fabrication with speedy "Fleet-Welding" Technique cuts costs. Only 300 man-hours required for erection of this structure.

Simplifying roof installation. Panels of 20-gauge formed sections are applied by plug welding them to purlins. Enamel was broken with a hammer, and 5/32" "Fleetweld 5" with 200 amps. penetrated through sheet and welded it to purlin. Total of 1680 welds made in 14 hours.

The sign of good "cooking". When you see 3 DOTS on an electrode, you know you have genuine "Fleetweld" . . . the world's leader for *low cost, speed* and *quality*. New, handy pocket manual giving procedures for all kinds of jobs free on request. Ask for Bul. 437.

New Lincoln sound-color movies available free for showing to groups. Write for information.

THE LINCOLN ELECTRIC COMPANY • DEPT. 332 • CLEVELAND 1, OHIO

America's greatest natural **recourse**

ARC WELDING

Both are tough . . . but ONE is tougher!

WHEN TWO barnyard cocks start out to settle their differences, one thing is certain—they can't both win. Both may be plenty tough . . . but one will be tougher.

MOST WIRE ROPES are tough, too, but some are tougher than others. Rochester wire ropes, we believe, stand up longer in the battle against wear, tear and strain.

ROCHESTER WIRE ROPES are extra strong for four good reasons: (1) the MEN who make them are expert workmen . . . (2) the MATERIALS are the finest we can buy . . . (3) the METHODS are those proved best by the test of our wide experience in wire rope fabrication . . . (4) the MACHINERY is the most modern in the industry . . . Rochester wire ropes in all sizes, types, grades and constructions are now available for prompt shipment. Rochester Ropes' engineers can advise you on your special problems of wire rope selection, use and maintenance. Inquiries invited.

LOCKED-IN LUBRICATION is forced by air pressure between individual wires. This process requires twice as much lubricant as is absorbed by other methods . . . protects against internal friction caused by rope passing over sheaves . . . assures longer life and better service from wire ropes made by Rochester.

ROCHESTER *Ropes*

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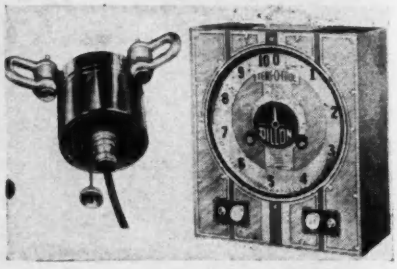
9½ in. brass dial and etched numerals 1 in. high. The master indicating motor, mounted to the dynamometer beam, unbalances at the slightest amount of tension or weight. This electrical excitation



is transmitted by cable to repeater stations, where the field of the receiving motor is correspondingly unbalanced with an accuracy of not less than 1½ percent. —*W. C. Dillon & Co., Inc., 5410 West Harrison St., Chicago 44, Ill.*

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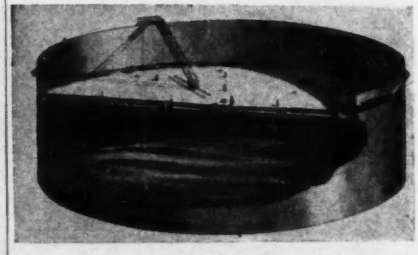
Floating Roof

An improved Horton floating roof of double-deck construction is available for flat-bottom tanks storing volatile liquids. The double-deck construction is said to insulate the liquid and eliminate practically all boiling thus extending the range



of products previously stored in floating roof tanks.

The bottom of the deck is sloped up toward the center and the roof is designed to vent all air from beneath the deck. The top of the deck is smooth and slopes toward the drain located at the center. The Horton seal closes the space between tank shell and deck. A sealing ring forms a long sliding contact with the tank shell and is joined to the deck by a continuous gastight curtain.—*Chicago Bridge & Iron Co., Chicago, Ill.*

• • •

Pump Booster

Heretofore inaccessible water supplies for fire fighting are made available with the Accel-O-Rate pump booster, it is announced, and this unit also permits water drainage from pits or cellars beyond reach of standard pumping equipment. This booster is said to lift water vertically 100 ft. or more and draft water from 200 to 300 ft. distances.

The unit employs the jet pump principle, has no moving parts, weighs 18 lb. and will not become clogged. It is easy

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M.S.A. Skullgards PROVIDE PROVED PROTECTION FOR CONSTRUCTION MEN!

Light, comfortable, easy to wear under all job conditions, M.S.A. Skullgards are *strong and tough* for dependable head protection. Exclusively high-pressure molded of laminated bakelite, Skullgards do not soften or deteriorate from exposure to sun, rain, perspiration, oils or common chemicals—the millions being worn daily prove their top popularity as standard work hats for every job.

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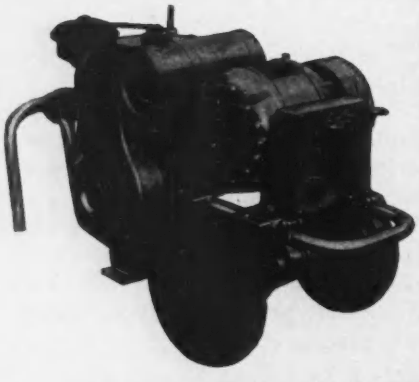
Forward movement requires little more than guidance on part of operator.

Tilted to make a second pass.

Here is, bar none, the most convenient, easy to handle, efficient and economical vibratory hand screed on the market today. One man operates it with ease — the vibratory impulses of the motor cause forward travel and little more than guidance is required. It will work right up to walls, is easily tilted and rolled back for second passes, and can be quickly adjusted over a range of nearly 4 feet without changing plank. Gives complete compaction through full depth of the slab and saves the cost of one man on the job. Model SC-11A — 13 ft. for 12 ft. section. Simple rugged 3 phase motor may be operated from commercial power. But, for a truly record-breaking combination use it with a

JACKSON PORTABLE POWER PLANT



Powered by husky Wisconsin engines and equipped with new type permanent magnet generators which require no adjustment or maintenance, JACKSON Portable Power Plants give you reliable power when and where you want it. They permit instant adjustment of frequency for placing or finishing either highly workable or very dry mixes, and provide both 3 phase and single phase power for operating all types of electric vibrators, lights and construction tools. Available in capacities of 1.25, 2.5, 5.00 K.V.A., 115 Volt, 60 Cycle A.C. (Model M-2, 2.5 K.V.A., shown at the left.)

Write for complete information and name of nearest JACKSON distributor.

ELECTRIC TAMPER & EQUIPMENT CO., LUDINGTON, MICH.

to install and use. When the pumper takes suction after priming, the driving water passing through the jet entrains additional water which is returned to the suction side of the pump.—*Derbyshire Machine & Tool Co.*, 5215 *Belfield Ave., Philadelphia* 44, *Pa.*

• • •

Portable Radial Saw

A portable 12-in. radial saw is available which, it is said, will save 25 percent or more of the usual power saw time on the average building or other production cutting job. This saw, made principally of light, non-rusting magnesium, weighs approximately 200 lb. complete with carrying frame and 1½-hp. electric motor; it

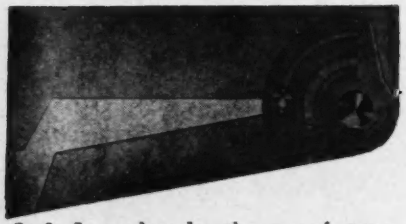
can readily be carried through a 30-in. doorway by two men.

With its 3 x 16-in. crosscut and 20½-in. wide ripping capacity, the saw will handle all work that a heavy stationary radial saw could perform it is claimed.—*American Saw Mill Machinery Co., Hackettstown, N. J.*

• • •

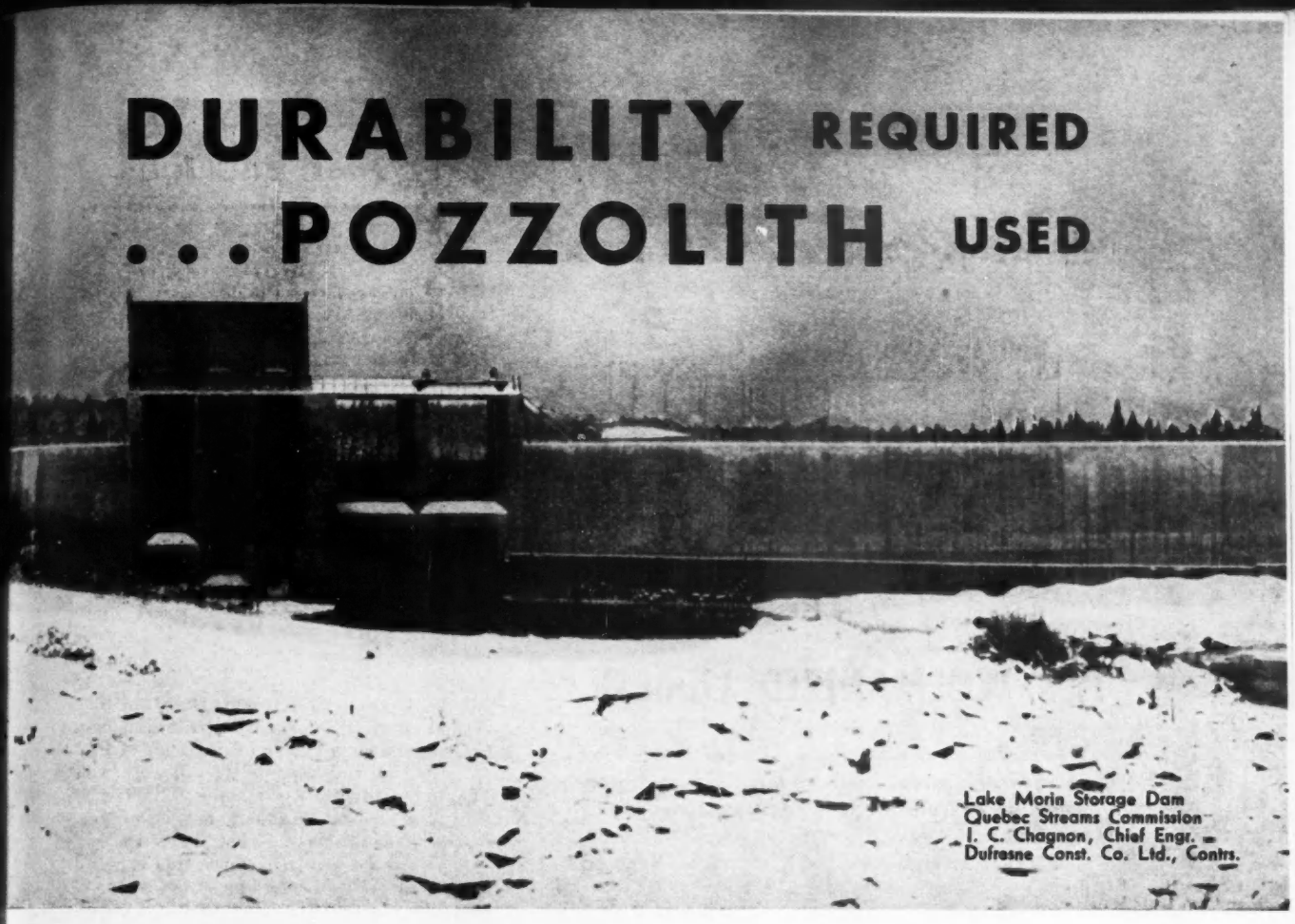
Adjustable Quadrangle

Angles from 0 to 90 deg., pitch scales from 0 to 24/12, percentage slopes from 0 to 100 percent, sine or cosine functions and tangents may be found with the new



S & J quadrangle, the manufacturer states. This plastic instrument, measuring 4 x 11 in., has a blank body and arm so that the owner may add his own most-used cut-out symbols and measuring scale. —*Stewart-Jackson Instrument Co., A. G. Bartlett Bldg., Los Angeles* 14, *Calif.*

DURABILITY REQUIRED ...POZZOLITH USED



Lake Morin Storage Dam
Quebec Streams Commission
J. C. Chagnon, Chief Engr.
Dufresne Const. Co. Ltd., Contrs.

The PROBLEM: To get durable concrete with the limited quality and grading of aggregates available at the remote location of this dam.

The SOLUTION: Pozzolith, Cement Dispersion.

Pozzolith produces all the benefits of air entrainment and does so with increased strength and at lower cost. Findings of the Nation's top testing authority prove this. Pozzolith's high standard of performance has won it wide acceptance as use in millions of cubic yards of concrete testify.

Would you like to have further information on the benefits of Pozzolith? Your request incurs no obligation.

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IT'S WOLMANIZED LUMBER*

This roof deck is going to last longer . . . they're using Wolmanized Lumber, the lumber impregnated with Wolman Salts* preservative—highly resistant to decay and termite attack.

It is recommended for use in structures exposed to:

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(3) Condensed water vapor in walls, floors and ceilings of refrigerated buildings
(4) Soil moisture and rain water held in joints, etc., of outdoor structures
(5) Moisture condensed by concrete or masonry

When you buy Wolmanized Lumber, you get *pressure-treated* lumber—the only reliable kind.

*Registered trademarks

1649 McCORMICK BUILDING, CHICAGO 4, ILLINOIS

Men and Jobs

George M. Reaves, colonel, CE, U. S. Army, has returned to the Turner Construction Co., New York City, as superintendent of construction. He was in charge of dock construction, port facilities and military construction, in the Khorramshahr area of the Persian Gulf Command. He was later engineer of the port of Le Havre, France. He received the Bronze Star and Legion of Merit for his overseas work.

Capt. E. A. Verpillot, USNR, of New York City has been appointed deputy expediter in charge of the Office of Production and Supply. He will work with **Rear Admiral Kirby Smith,** USNR, general deputy expediter, and in general will have charge of the production end of the Veterans Emergency Housing Program. Under him will be the technical research, prefabrication production, construction, materials, and labor relations branches of the organization. During the last 20 years Captain Verpillot has been responsible for the design and construction of many heavy construction projects in this country, Alaska and the Aleutian Islands. For a number of years he was engineer in charge of design and construction for the Department of Plant and Structures and the Department of Docks of the City of New York. During that time he built bridges, power plants, sub-stations, ship repair facilities, piers, ferry terminals, docks, dry docks, and industrial plants.

Henry A. Ross was recently named assistant city engineer in El Centro, Calif. Since August, 1945, Ross has been city engineer at Redding where he is succeeded by **W. W. Green** who is acting city engineer.

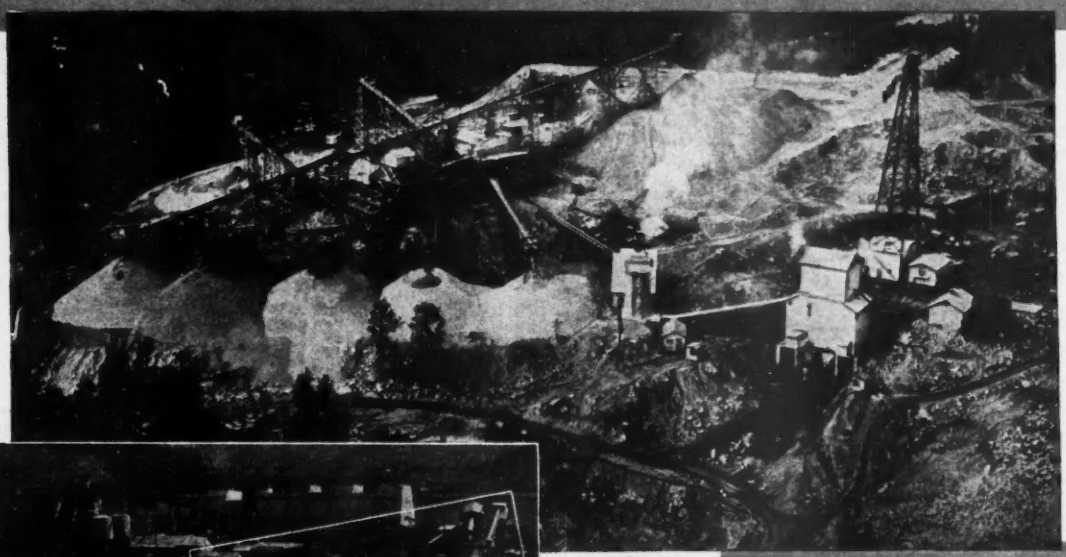
James L. Gillespie is the new city engineer and superintendent of water, street and sewer departments of Hapeville, Ga. He succeeds W. B. Adams, resigned.

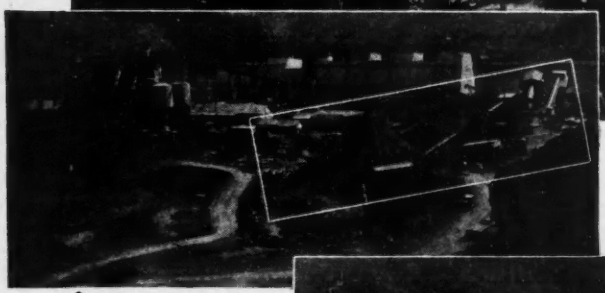
M. T. Decker, partner and chief of design with Downer, Green & Carrillo, engineers for the New York Municipal Airport at Idlewild, has resigned and opened offices at 15 South William St., New York, for private practice, especially in airport work. He was formerly

For large construction projects

TELSMITH

COMPLETE PLANTS





1,500,000 cu. yds. of aggregate for Norfork Dam.

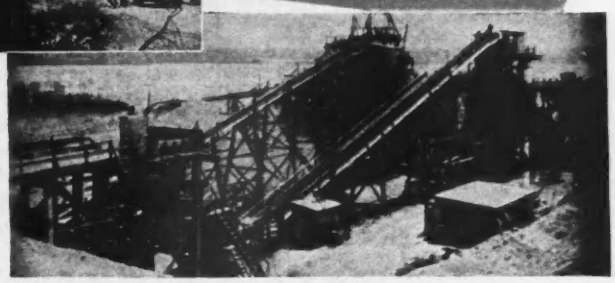
1,500,000 tons of aggregate for Center Hill Dam.

West Mountain Plant serves many Pennsylvania projects.

1,000,000 yds. of aggregate for Delaware Aqueduct.

● When it's a big job and urgent —there's usually a Telsmith sand and gravel or rock crushing plant. A complete plant, soundly designed by Telsmith engineers—with accurately balanced Telsmith-built machinery . . . completely adequate as to crushing, screening, classifying capacity . . . fast and flexible in operation . . . entirely dependable as to product quantity, quality and sizing. For reasons *why*—get Bulletin EP-2.

MP-6



Large projects in New England are served by this Telsmith plant.

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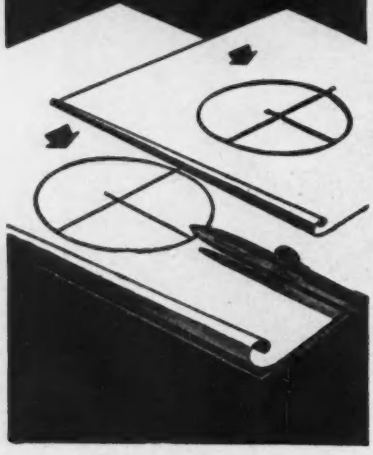

● The renown of Imperial as the finest in Tracing Cloth goes back well over half a century. Draftsmen all over the world prefer it for the uniformity of its high transparency and ink-taking surface and the superb quality of its cloth foundation.

Imperial takes erasures readily, without damage. It gives sharp contrasting prints of even the finest lines. Drawings made on Imperial over fifty years ago are still as good as ever, neither brittle nor opaque.

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in New York City parkway design for the Long Island district of the New York State Department of Public Works.

Hugo Benefield, Atlantic, Iowa, has been named Union County engineer, replacing **William J. Bester,** resigned, to go with the Portland Cement Association.

Millard Hill, Belle Fouche, S. D. has been chosen city engineer there to fill the vacancy left by the resignation of **W. E. Thompson.**

After being on the engineering staff of the Dominion Steel and Coal Corp., Sydney, N. S., for 42 years, **F. W. Gray** has retired. For many years he had held the position of assistant to the general manager.

Brig. Gen. Hans Kramer (USA-ret.) is now affiliated with Sverdrup & Parcel, St. Louis, Mo., at the San Francisco, Calif., office. He will specialize on hydraulic structures and navigation and flood control projects.

James E. Mast and **William D. Williams** are continuing as Mast and Williams, consulting engineers, at Reading, Pa.

Joe Terry, division engineer at Tulsa for the Oklahoma Highway Department, has been made maintenance engineer, succeeding **Stoney K. McLelland,** who resigned to become co-ordinating engineer for Tulsa. **Drury Spencer,** maintenance resident engineer at Muskogee, was named assistant division engineer at Ada to succeed **E. J. O'Dell,** now Tulsa division engineer.

George O. Evans has been assigned as area engineer on the Fort Randall project in South Dakota. He was graduated at the Mississippi State College and has been associated with the Corps of Engineers since 1927. In 1938 he joined the Omaha district where he headed the engineering division. He was commissioned in the Corps of Engineers in 1942 and separated from the service as lieutenant colonel in April, 1946.

Cyrus F. Breedon, of Fulton, Ill., former post engineer at Stroher Army airfield, has been named city manager of Winfield, Kan. He succeeds **Phil Frankenfeld,** who had served since 1937.

Walter R. J. MacNeil, civil engineer has been named town manager of Mount Royal, Que.

Col. George W. Goethals of the Corps of Engineers, Buffalo, N. Y., has been awarded the Legion of Merit in recognition of his work in carrying out the federal program of river, harbor and flood-control during the war.

Ambrose J. Desmond, civil engineer, has been assigned to the staff of Klamath National Forest, Calif. He will make surveys for access roads.

D. L. Briegel, civil engineer graduate of Ohio State University, who has had wide experience in public works, industry and construction, is now a partner in Zisler, Briegel and Associates, Detroit, Mich.

Luther M. Leisenring, long a civilian employee of the Corps of Engineers, has received the Meritorious Service Award. He was the consulting architect in the design and construction of the Pentagon Building.

Francis A. Jacocks, who was connected with the North Carolina State Board of Health prior to entering the U. S. Public Health Service, has been appointed engineer in charge of the health department's sanitary division at Charlotte, N. C.

Angus Smith, Ottawa, Ont., has been named town engineer of Arnprior, Ont.

Henry Martyn Chance II, graduate of Towne Scientific School, University of Pennsylvania, is assistant to the president of United Engineer & Constructors, Inc., Philadelphia, Pa.

Several shifts of engineers, effective July 1, have taken place in the Virginia State Highway Department, as follows: **J. H. Walker,** district engineer at Fredericksburg, will go to the central office in Richmond as assistant to Purchasing Agent **W. W. McClevy. W. F. Smith,** resident engineer at Fairfax, will replace Mr. Walker at Fredericksburg and **J. H. Phillips,** resident engineer at Culpeper, will go to Fairfax in Mr. Smith's place. **J. N. Harris,** assistant resident engineer at Petersburg, will become resident engineer at Culpeper. **T. B. Talbott,** temporarily assigned to Wise as resident engineer, will be shifted to Saluda to relieve **P. O. Bailey,** who will be assigned to Salem as assistant resident engineer in place of **J. R. Crill,** and Mr. Crill will be promoted to resident engineer at Wise.

C. W. Kestner, resident engineer at Norfolk, will be shifted to Fredericksburg to relieve **C. W. Staggs,** and Mr. Staggs, now resident engineer at Fredericksburg, will become assistant resident engineer at Norfolk in place of **W. S. Griffin,** who will be promoted to resident engineer at Suffolk in place of **E. D. Hubbard.** The latter, in turn, will shift to Norfolk as resident engineer in place of Mr. Kestner.

...AND A BIG JOB GETS *all the air it needs*

This story concerns an air compressor used indoors. It tells how a G-E motor enabled the compressor to fit into a very tight space. But it applies equally well to users of air compressors on outdoor construction jobs where portability and ease of handling are important.

Back in 1943, engineers of an eastern industrial concern found that unless they could increase their compressed-air capacity quickly, vital war production was going to fall behind schedule. The problem was—where to put an extra air compressor in a plant already jam-packed with machinery.

There was just one empty corner about 10 by 12 feet in area. A compact high-speed air compressor might be squeezed in. But that left no room for a belt- or shaft-connected drive-motor. The answer was a motor that could be mounted right on the compressor—an unusually compact, close-coupled synchronous motor.

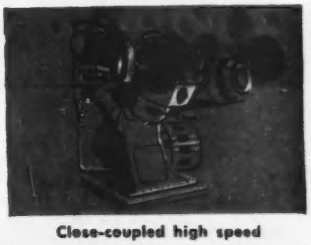
Today, both the compressor and its G-E motor can boast of a perfect three-year performance record, and the combination is still going strong. It has never failed to meet a sudden increase in compressed air demand, and has operated throughout every night shift with no more maintenance than routine inspection and lubrication.

Close-coupled for Economy

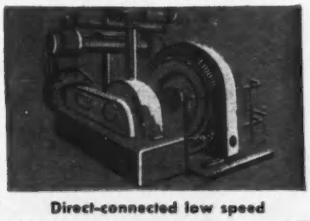
G-E close-coupled synchronous motors have won wide acceptance among compressor users in the construction field. Because the rotors are precision fitted directly to the compressor crankshaft, these motors need no outboard bearing or separate foundation. The motor air gap is uniformly and permanently maintained. Installation is simple, too—it is easy to align the motor flange with the compressor frame.

Whether you make compressors or use them, you will be interested in the design and maintenance savings made possible with compact G-E synchronous motors. Write or phone your nearest G-E office. *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

G-E SYNCHRONOUS MOTORS FOR COMPRESSORS



Close-coupled high speed



Direct-connected low speed

Belt-connected Tri-Clad

GENERAL ELECTRIC

750-272-5099

BASIC DESIGN

FOR TOP PERFORMANCE

The basic principle of applying wedging action at 4 points near the edges of the valve discs is exclusive Mueller-Columbian design. This feature prevents warped or sprung discs and assures tight closing of the valve and is just one of several reasons these valves eliminate the necessity of frequent repair. Next time, insist upon Mueller-Columbian. Your inquiries will receive prompt attention.

MUELLER CO.
DECATUR, ILL.

Manufacturers' Activities

RETIREMENT of Carl O. Wold a vice president of Caterpillar Tractor Co. and executive head of the Russell Grader Manufacturing Co., prior to its acquisition by "Caterpillar" in 1928, is announced. One of the best known pioneers in the heavy construction machinery industry, Mr. Wold retires after 40 years of service, including special assignments during both world wars. In his executive capacity with both Russell and "Caterpillar" Wold guided engineers and designers in producing machinery that helped revolutionize the industry.

Carl O. Wold

The Russell company was the first to use a separate power unit on elevating graders and was a pioneer in producing motor graders. In 1917 Mr. Wold also assisted in introducing commercially the forerunner of the modern bulldozer. At "Caterpillar", under Mr. Wold's guidance, the old idea of motor graders, with grader frames mounted over track-type or wheeled tractors, was discarded and a new motor grader, redesigned from the ground up, with the engine placed behind the operator, was produced. With the engine up out of the dirt, more weight over the driving wheels for additional traction, mechanical power controls, rigid axle drive, high bank cutting blade positions, etc., there was brought about a speedy and efficient construction tool.

R. G. LETOURNEAU, INC., of Peoria, Ill., has announced the appointment of Stanley D. Means to the newly-created position of domestic sales manager. Means will have responsibility over all LeTourneau sales in the United States, Canada, Hawaii, and Alaska. His duties will include management of LeTourneau's eastern, central, and western sales territories, and governmental sales, as well as continued personal supervision of industrial sales. First appointed as a field engineer, he has

AVAILABLE in both hand and MOTORfeed models, the improved CP-60N 3½" Drifter Drill is 10% faster than its predecessor, the well-known CP-60 Drifter. Powerful rotation makes it ideal for drilling in fitchery or ravelly formations, tunneling from Jumbo drill carriages or standard column mounting. Powered by compact, dependable rotary type motor, the MOTORfeed model enables operator to maintain correct position for maximum drilling and rapid reverse for changing steel. Write for full data on the faster CP-60N Drifter Drills.

In addition to the CP-60N, Chicago Pneumatic makes two other models of fast-drilling MOTORdrifters: the 3" CP-50, and 4" CP-70: also a parallel line of CP Hand-Feed Drifter Drills.

★★★★★★★★★
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Phone For Pick-Up as soon as package is ready. Special delivery at other end often means same-day delivery between many airport towns and cities as far as 1,000 miles apart.

Air Express goes everywhere. In addition to 375 airport towns and cities, it goes by rapid air-rail schedules to 23,000 other communities in this country. Service direct by air to and from scores of foreign countries in the world's best planes, giving the world's best service.

RATES CUT 22% SINCE 1943 (U. S. A.)					
AIR MILES	2 lbs.	5 lbs.	25 lbs.	40 lbs.	Over 40 lbs. Cents per lb.
149	$1.00	$1.00	$1.00	$1.23	3.07¢
349	1.02	1.10	2.20	3.68	9.21¢
549	1.07	1.42	3.84	6.14	15.36¢
1049	1.17	1.90	7.68	12.28	30.70¢
2349	1.45	3.53	17.65	28.24	70.61¢
Over 2350	1.47	3.68	18.42	29.47	73.68¢
INTERNATIONAL RATES ALSO REDUCED					

Write Today for the Time and Rate Schedule on Air Express. It contains illuminating facts to help you solve many a shipping problem. Air Express Division, Railway Express Agency, 230 Park Avenue, New York 17, N. Y. Or ask for it at any Airline or Railway Express office.

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served as district representative, training manager, federal sales representative, and government sales manager. In April, 1942, he was appointed manager of the Washington, D. C., office. Returning to Peoria in 1945 as industrial sales manager, he has been instrumental in setting up LeTourneau's new specialized railroad distributor organization.

RAYMOND J. DERVEY is in charge of the Pittsburgh, Pa., office of the American Hoist & Derrick Co., taking the place of Ralph Thomson, now manager of the New York office.

HOWARD A. GLENN is president of the Standard Bitulithic Co., New York, and Troy Carmichael is now chairman of the board of directors.

RICHARD S. SAWYER is assistant general manager of purchasing and traffic for Rheem Mfg. Co., New York.

GENERAL OFFICES of the Clay Sewer Pipe Assn., Inc., are now in the Huntington Bank Bldg., Columbus, Ohio.

MINNEAPOLIS HONEYWELL REGULATOR Co., has bought a new plant at Leaside, near Toronto, Ont., to triple its Canadian manufacturing facilities.

CATERPILLAR TRACTOR Co. has formed a manufacturing development division under the direction of C. A. Matheny.

HAROLD W. MURRAY is in charge of sales and distribution on precast and prestressed floor and roof slab concrete building materials for Flexicore Co., Inc., New York City.

THE NAME of the Marion Steam Shovel Co. has been changed to Marion Power Shovel Co.

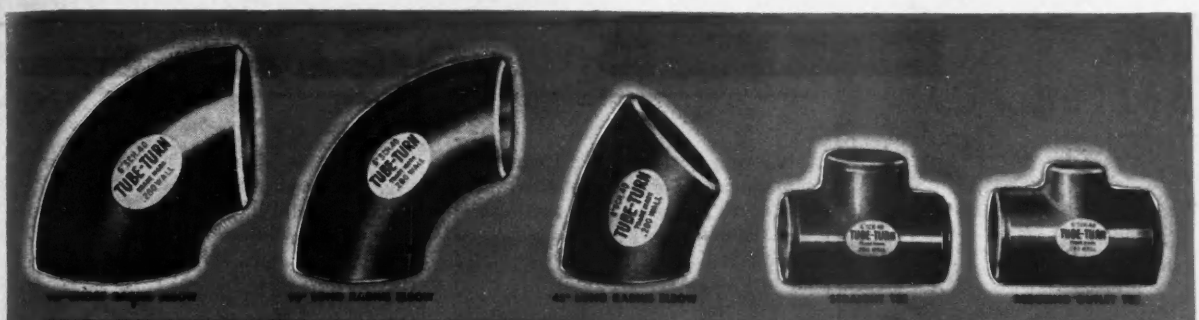
LIEUT. WILLIAM E. DICKINSON has joined the Calcium Chloride Assn. as civil engineer on technical service.

COL. ROSS L. MAHON is western representative for the S. Morgan Smith Co. of York, Pa. His headquarters will be at San Francisco, Calif.

CAPT. W. MCKEAN WHITE, released from the Army Air Forces, has returned to his pre-war position as vice-president of the White Mfg. Co., Elkhart, Ind.

NORMAN R. DOWNIE is manager of sales for the wire rope division of the Bethlehem Steel Co.

A. T. MARCHUK is the new production manager of Athey Products Corp., Chicago, Ill. A. W. Fulton has returned to the sales staff after service in the Navy.



TUBE-TURN

TRADE MARK

WELDING FITTINGS AND FLANGES

TUBE-TURN WELDING FITTINGS—RANGE OF SIZES

Type of Fitting	Description	Standard Weight	Extra Strong	Schedule 160	Double Extra Strong	Light Gauge	
						Nominal Pipe Size	Iron Pipe Size
Elbows	90° Long Radius	½"-24"	½"-24"	1"-12"	¾"-8"	4"-24"	3"-12"
Elbows	90° Short Radius	1"-30"	1½"-30"				
Elbows	45° Long Radius	½"-30"*	½"-30"*	1"-12"	¾"-8"	4"-24"	3"-12"
Returns	180° Long Radius	½"-24"	½"-24"	1"-12"	3"-8"	4"-24"	3"-12"
Returns	180° Short Radius	1"-30"	1½"-30"				
Returns	180° Extra Long Radius	1"-2½"	1"-2½"				
Tees	Straight	½"-24"	½"-24"	½"-12"	½"-8"		
Tees	Reducing Outlet	½"-24"	½"-24"	½"-12"	½"-8"		
Reducers	Concentric & Eccentric	1x½-24x20	1x½-24x20		1x½-8"x6"		
Caps		1"-24"	1"-24"		1"-8"		
Stub Ends	Lap Joint	1"-24"	1"-24"				
Nipples	Shaped, 90° to Header	1¼"-12"	1¼"-12"				
Nipples	Shaped, 45° to Header	1¼"-12"	1¼"-12"				
Saddles		2"-24"**					
Laterals	Straight	1¼"-24"	1¼"-24"				
Laterals	Reducing-on-Run	1¼"-24"	1¼"-24"				
Crosses	Straight	¾"-24"	¾"-24"				
Rings	Welding	¾"-12"	¾"-12"				
Sleeves	Welding	2"-24"**					

SUPER Tube-Turn 45° long radius elbows, 90° long radius elbows, and 180° long radius returns available in both Standard weight and Extra Strong in sizes from 3" to 12".

Tube-Turn welding fittings and flanges conform to applicable ASA and ASTM Standards. For further details please refer to Tube Turns catalog and data book No. 111.

*30° size short radius

**Since saddles and sleeves are used for external reinforcement only, they do not conform to iron pipe size thicknesses.

TUBE-TURN FORGED STEEL FLANGES—RANGE OF SIZES

	150 Lb.	300 Lb.	400 Lb.	600 Lb.	900 Lb.	1500 Lb.	2500 Lb.
Welding Neck	½"-24"	½"-24"	½"-24"†	½"-24"	½"-24"*	½"-24"	½"-24"
Slip-on	½"-24"	½"-24"	½"-24"†	½"-24"	½"-24"*	½"-24"	½"-24"
Lap Joint	½"-24"	½"-24"	½"-24"†	½"-24"	½"-24"*	½"-24"	½"-24"
Threaded	½"-24"	½"-24"	½"-24"†	½"-24"	½"-24"*	½"-24"	½"-24"
Blind	½"-24"	½"-24"	½"-24"†	½"-24"	½"-24"*	½"-24"	½"-24"
Socket Type	¼"-24"	¼"- 4"		¼"-3½"			
Reducing-threaded or slip-on	¾"-24"	¾"-24"	¾"-24"†	¾"-24"	¾"-24"*	¾"-24"	¾"-12"
Orifice—threaded		1"-24"	4"-12"	4"-12"	3"-12"	1"-12"	
Orifice—slip-on		1"-24"					
Orifice—welding neck		1"-24"	4"-12"	1"-12"	3"-12"	1"-12"	
Long Welding Neck	1"-24"	1"-24"	1"-24"	1"-24"	1"-24"	1"-24"	1"-12"

†Dimensions on sizes thru 3½" same as for 600 lb. flanges.
*Dimensions on sizes thru 2½" same as for 1500 lb. flanges.

Selected Tube Turns Distributors in every principal city are ready to serve you from their complete stocks.

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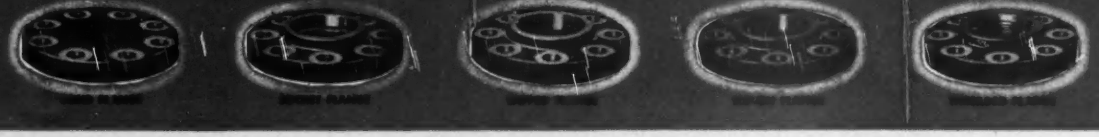
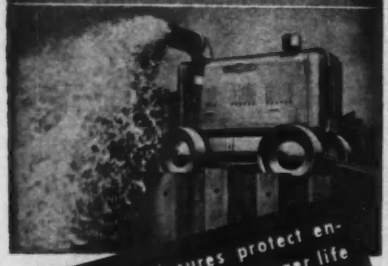


JAEGER BUILDS BETTER PUMPS INSIDE and OUT



Modern enclosures protect engine efficiency...add longer life

2 inch

Experienced contractors buy far more Jaeger "Sure Primes" than any other make of pump. They know that all "Sure Prime" pumps are better engineered, conservatively rated, powered with high grade engines and enclosed in modern housings that keep those engines dry, clean, quick-starting and smooth running for extra thousands of hours of low cost service.

Protected Yet Accessible

10 inch

Instant opening side panels admit to all operating controls. Enclosures are also designed to lift off or swing open for complete access when desired. One of many exclusive Jaeger advantages.

Capacities 3000 to 240,000 g.p.h.

Only Jaeger Offers All These Features:

Inherent priming action plus "jet" priming—fastest and doubly sure . . . "Lubri-Seal," accessible for inspection . . . Self-cleaning shells . . . Replaceable liners or seal rings . . . Pumps individually tested and certified for performance.

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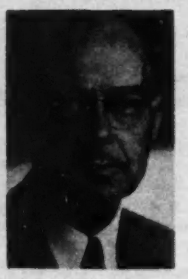
Elections and Activities

A recent meeting of the Pacific Northwest Sewage Works Association at Gearhart, Ore., approved the report of a special committee, opposing the ozone method of sewage treatment, (*ENR* June 20, vol. p. 2).



C. M. Howard

The association elected C. M. Howard of Seattle, of the Concrete Pipe & Products Association, as its new president, with H. C. Clare of Boise, Idaho, as first vice-president; K. H. Spies of Portland, Ore., as second vice-president; and W. P. Hughes, city engineer of Lewiston, Idaho, as secretary-treasurer.

Clyde V. Taylor has been elected president of the Associate Private Civil Engineers of Nevada. E. P. Osgood, Sr., was named vice-president and John Curran secretary-treasurer.

W. S. McKay, of St. Thomas, Editor of *The Municipal World* has been elected president of the Ontario Good Roads Association. More than 1500 delegates, mainly from the local governmental units throughout Ontario concerned with highway matters, attended the recent meeting. Mr. McKay succeeds W. H. Keith, engineer of Wellington County, who now becomes one of the associations's two honorary presidents. W. J. Moore was elected first vice-president and D. J. Emrey, engineer of Waterloo County, second vice-president. Among the matters discussed was the need for a research and testing laboratory for the Ontario Department of Highways.

Officers of the South Dakota Society of Engineers and Architects have been elected, as follows: President, K. H. Scurr, state bridge engineer, Pierre; vice-president, Wm. F. Blatherwick, architect, Sioux Falls; secretary-treasurer, W. W. Towne, state sanitary engineer, Pierre. Directors: W. J. Dixon, architect, Mitchell; W. E. Thompson, city engineer, Belle Fourche; C. H. Sinclair, engineer, C. & N. W. Ry., Huron; and H. M. Pierce, city engineer, Aberdeen.

H. E. Cope, of A. Cope and Sons, contractors of Hamilton, was elected President of the Ontario Highway Construction Safety Association at its recent annual meeting.

New officers of the New Mexico Reclamation Association are: Oscar Love, re-elected president for his fifth term; Harry B. Tellyer and H. Vearle Payne, first and second vice-presidents, and E. H. Foster, Robert T. Lingle, Hubert Ball, John T. McMillan, John L. Gregg, and W. A. Losey, directors.

L. A. Merlo, of the Sterling Construction Co. Ltd., Windsor, was elected president of the Ontario Road-builders' Association at its annual meeting held in Toronto recently. He succeeds the late C. H. Covey. Tillis N. Carter of the Carter Construction Co., Toronto, and J. S. Mitchell of the Towland Construction Co., London, were elected to the positions of vice-presidents.

The Georgia Highway Contractors Association has been reactivated in Atlanta, with offices in the Ansley Hotel. The association was originally formed in June, 1937. In November, 1942, it became dormant due to the press of war activities. Paul L. Andrews, has returned from the Navy, where he served as a lieutenant commander, and has resumed as executive secretary of the association.

Texas Society of Professional Engineers, Pan Handle Chapter, at Amarillo, has elected the following officers: G. K. Reading, president; Morris Browning, vice president, and J. L. Adams, secretary-treasurer.

John Rumsey has been elected president of the Mountain Pacific Chapter, Associated General Contractors, at Seattle, Wash. Harold Wasson was elected vice-president; Paul Fiorito, treasurer; C. W. Erickson, national director; M. P. Munter, E. J. White, Wayne Sutton, K. S. Goulter, T. H. Orme, J. B. Shotwell, Okey Gregg, U. R. Schumann and Harry Hawkins, chapter directors; Nels Johnson, associate trustee.

W. R. Spencer is chairman of the Arkansas Water and Sewage Conference; J. R. Pierce, vice-chairman; and Harrison Hale, secretary. Executive board, Spencer, Gaston F. Bell, W. G. Check, Tom E. Farabaugh, Fay Peer, and Neal Thayer.

Edgar A. Cross has been named chairman of the Toronto branch of the Engineering Institute of Canada. Vice-chairman is Robert F. Legget. E. G. Tallman will continue as secretary-treasurer. The executive board, E. R. Graydon, C. D. Carruthers, J. F. McLaren, J. G. Hall, D. G. Geiger, and H. A. Babcock.

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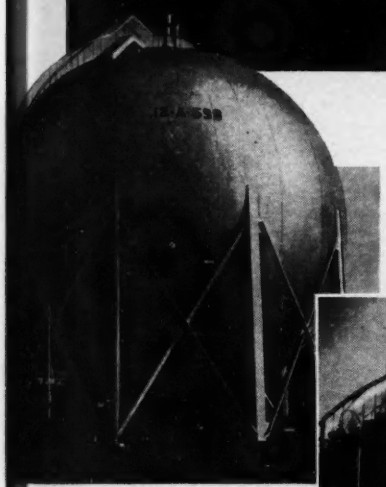
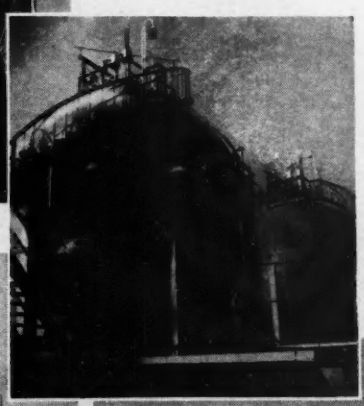
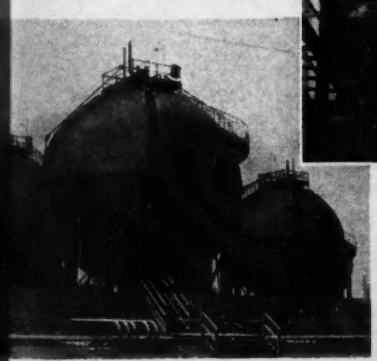
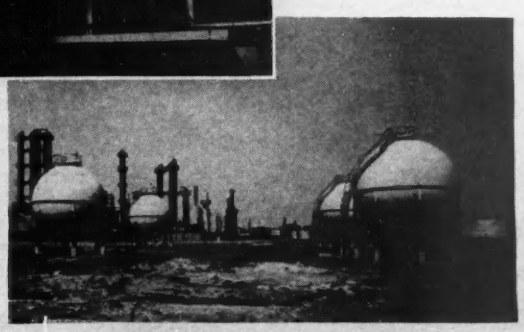
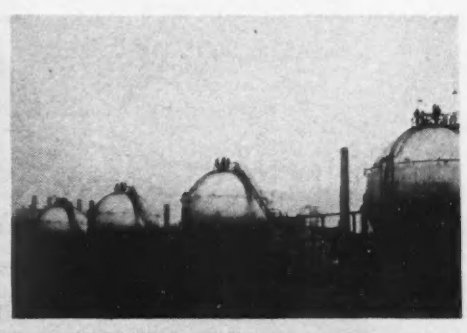
—Designed and built to serve your specific storage requirements











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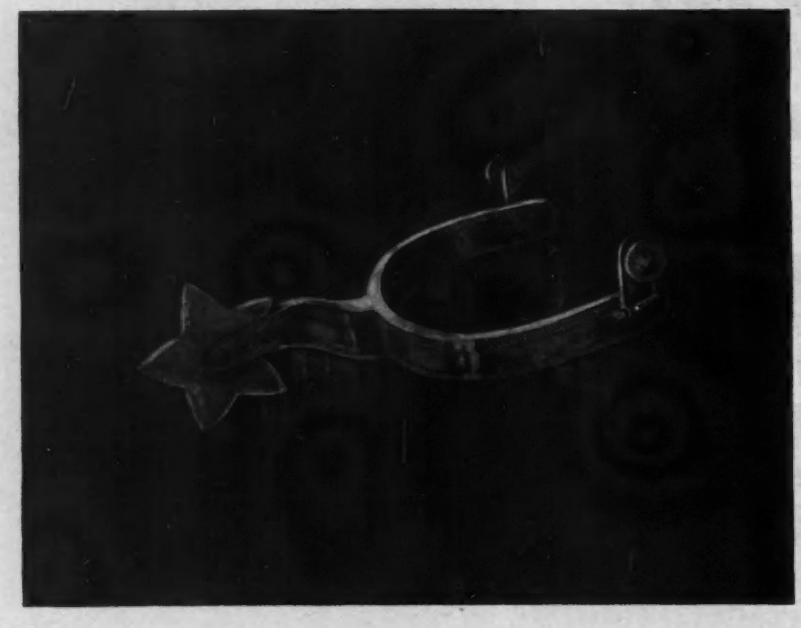

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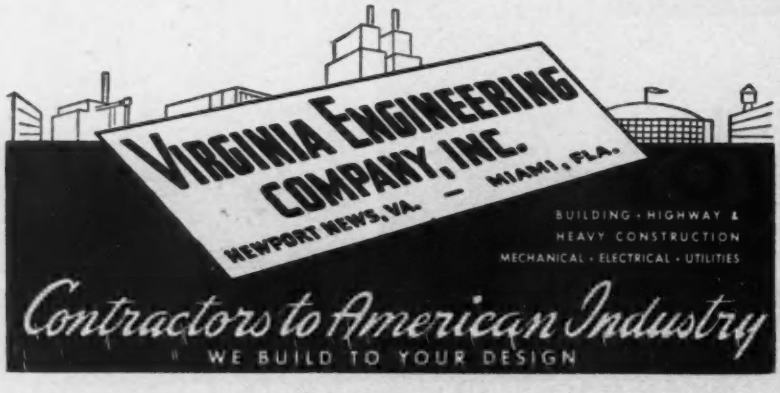
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Prefabricated Houses—A 24-page illustrated booklet describes the houses being made under the Veterans' emergency housing program. The booklet, written by Harry H. Steidle, explains the construction, erection, financing and distribution of these permanent factory-built homes and answers the many questions that the public has asked about them. *Prefabricated Home Manufacturers' Institute, 1232 Shoreham Building, Washington 5, D. C.*

Hydraulic Suction Dredges—A complete exposition of the subject of hydraulic dredge design is contained in a finely illustrated catalog. It takes up such matters as hull construction, the power plant, the pump, the hoists, the guiding machinery, the cutter drive and machinery, the ball joints and pontoon lines. Listed also are about 30 other products of this manufacturer.—*Kinmont Manufacturing Co., Inc., Los Angeles, Calif.*

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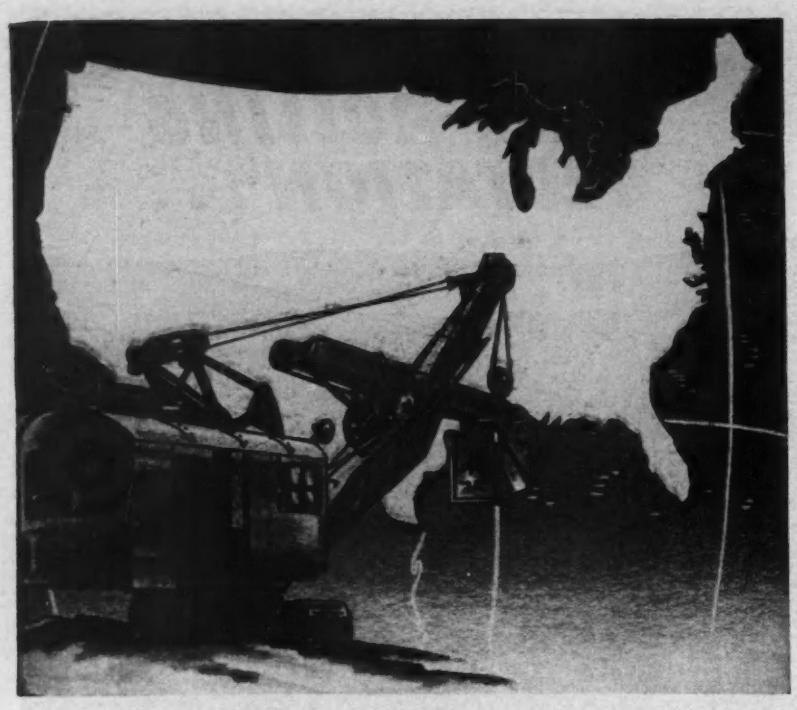

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Electric Tools—A new catalog illustrates and describes a complete line of electric tool equipment which includes portable electric hammers, drills, screwdrivers, nut runners, grinders, sanders and semi-portable hack saws, widely used in plant maintenance and plant production.—*Syntron Co., Homer City, Pa.*

Calcium Hypochlorite — A colored folder gives information and tables on a convenient and economical method of using calcium hypochlorite in and around municipal and private water works. *Pittsburgh Plate Glass Co., Columbia Chemical Division, Fifth Avenue at Bellefield, Pittsburgh 13, Pa.*

Motor Grader—A catalog features a postwar motor grader with many new features in design including a high-arch front axle and a full-floating rear axle. It has been tested on every type of road building work.—*J. D. Adams Mfgr. Co., Indianapolis, Ind.*

Pictorial Drafting—The principles of pictorial engineering drafting, as utilized in isometric and dimetric projection, are explained clearly and concisely in a 20-page illustrated booklet written by Paul F. Boehm.—*John R. Cassell Co., Inc., 110 West 42nd St., New York 18, N. Y.*

INCENTIVES FURNISH THE DRIVE

THE COMING YEAR, 1946, and the years to follow can bring unprecedented prosperity to the people of the United States if the incentives to secure it are provided.

We have the advantage of starting with an economy which has demonstrated a capacity for expansion unequalled in any other country in the world. Our economy has demonstrated, also, one grave weakness—a recurring interruption of the upward trend of production and living standards by wasteful and paralyzing periods of recession. Recovery from each depression always has carried us to new heights of economic welfare, but the toll of the years of blight has been harmful to everyone.

The job ahead of us is a dual one. We must maintain the vitality of an economy which, over the years, has yielded an enormous increase in the American standard of living, and we also must improve its stability.

The Dynamics of American Production

In the last prewar year, 1940, the population of the United States was 3⅓ times as large as it was in 1870. But the national production, measured in dollars of constant purchasing power, was 10 times as large at the end of the period, and industrial output had increased 20-fold.

In the meantime, the average number of hours of factory workers had been reduced from about 63 per week in 1870 to less than 40 in 1940, while average hourly earnings had more than trebled in dollars of constant purchasing power. Thus "real" weekly or annual wages in manufacturing had doubled over the 70-year period, even though the work-week was cut by 35 per cent. This was made possible chiefly by a tremendous increase in the quantity and quality of the mechanical facilities which were provided in American manufacturing industry. Manufacturing capital investment per worker was multiplied by 6 times over the period in question. But the return per dollar invested, while it has fluctuated widely between good years and bad, showed no general upward trend over that portion of the period for which measurement is practicable.

Incentives in American Manufacturing

There has been, historically, a remarkably consistent pattern in the division of the realized income from the expanding manufacturing output of America. Reliable statistics are not available for as far back as 1870, but from 1899 through 1939 the average share of wages and salaries has been 82½ per cent against 17½ per cent as the share to investors (including dividends, interest, rents, royalties, and non-corporate profits). There have been, from year to year, relatively minor divergences from this pattern of distribution, but there is no discernible trend during the period away from the averages cited.

It is suggested that the persistence of the average 17½ per cent share of realized income from manufacturing that was maintained for the 40 years preceding World War II may represent the proportion that is needed to produce the dividends, interest, rents, royalties, and non-corporate return that will provide for the continuing investment upon which an expanding productivity such as we have had in the past depends. At any rate, it would seem reckless to depart too radically from such an established pattern at a time when unprecedentedly large private capital investment is counted on to make up for the drastic curtailment of such investment during the war years, and to carry us to the new high levels of civilian production set as our postwar goals.

The Distribution of Manufacturing Income in War

At the beginning of the war, the Government adopted controls and a tax program designed to prevent wartime activity from resulting in un-

duly swollen private returns. Due primarily to huge volumes, the profits *before* taxes of manufacturing industry were very high, but throughout the war its profits *after* taxes averaged returns no larger than they had been in good prewar years. Relative to volume, they were considerably lower than in prosperous years in the past. Again, there can be no complaint at results that generally were in accord with a national wartime policy.

But it is fair to note that the wages of manufacturing labor were allowed to increase substantially during the war. Between January 1, 1941 and April, 1945, average weekly earnings per worker increased by 77 per cent. This was, in considerable part, a result of increased working hours and a shift from low- to high-paid industries, but straight-time hourly earnings on the same jobs increased about 40 per cent against a cost-of-living rise of about 30 per cent.

The net result was to alter drastically the 40-year relationship of the 17½-82½ per cent division of Realized Income from Manufacturing. The share of wages and salaries increased to over 90 per cent, and the investment share shrunk to less than 10 per cent.

Its Postwar Distribution

This wartime shift in the proportion of distributive shares has an important bearing upon current wage controveries. With union demands for wage increases ranging up to 30 per cent, and the economists of the Office of War Mobilization and Reconversion asserting that an average increase of 24 per cent is feasible without raising prices, it is pertinent to inquire how such increases would affect the prewar ratios that governed realized income distribution in manufacturing.

Forecasting is always hazardous, but if we assume (1) that in 1946 we shall reach the $160 billion level of national output which the Government proponents of general wage increases expect, and (2) that there will be little increase in productivity because of the continuing process of reconversion, and (3) that the Government will succeed in carrying its announced purpose to maintain present price ceilings, it appears that a 24 per cent general wage increase would reduce the share going to capital from 17½ per cent to 11 per cent even allowing for its increased return resulting from the repeal of the excess profits tax. The prewar ratios would be about maintained if wages remained at present levels.

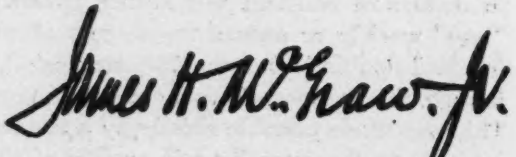
Conclusion

Since the maintenance of these prewar ratios was accompanied by an unparalleled rise in the "real wage" of American workers, there is a powerful prima facie case for not tinkering with them. It should be noted, however, that some economists think that the size of the investment share of manufacturing income tends to provide more capital than can be absorbed by a mature economy, and thus contributes to those breaks in the expansion of the economy which, as stated at the outset, have been its principal blight.

Regardless of what may ultimately prove to be the validity of this view, no one can responsibly contend that at this early but crucial stage in the reconversion process is the time to test it. Now, no one knows whether, or what dimension of, additional wage increases can be supported without forcing up prices or reducing profits to a point that will discourage vitally needed private capital investment.

We want high and increasing wages in American manufacturing. We need them to provide an active incentive to workers to support expanding productivity, as well as to continue the trend of rising living standards in America. Equally, we need a continuing profit incentive of sufficient attractiveness to call forth the new investment upon which expanding productivity depends.

We can never attain our dual objective if we push one of these aims so far and so fast that it defeats the other.



President, McGraw-Hill Publishing Co., Inc.

THE FAILURE OF "FACT-FINDING"

THE PRESIDENT has asked Congress to grant him authority to appoint fact-finding boards to deal with nationally important labor disputes. Most citizens would like to see some reasonable and objective solution of the industrial strife that now is disrupting reconversion. Unfortunately, the record of the "fact-finding" procedure indicates that any claim of impartiality for this process is a gross misrepresentation.

The Administration bill would authorize the President to appoint such boards in cases certified to him by the Secretary of Labor. Each board would report to the President "its findings of fact and such recommendations concerning the dispute as the board deems appropriate." Its facilities and staff would be provided by the Secretary of Labor. The bill provides for an interval of not more than 30 days known as a waiting or "cooling off" period during which it would be "unlawful" (though no penalties are specified) for anyone to promote or encourage work stoppages.

Because the Administration did not wait for Congressional action upon its proposal, but appointed a number of fact-finding bodies to deal with current emergency cases, we have been afforded at least a partial preview of how the procedure may be expected to work out if laws establishing it are passed.

If the reports handed down by the fact-finding panels in the General Motors and oil disputes may be regarded as representative, it can be stated conclusively that Government-appointed "fact-finding" boards will concern themselves to only a minor degree with the establishing of facts. A far greater share of their effort will be concerned with the speculative business of forecasting future output and production efficiency and appraising the "ability to pay" of the companies involved. But the predominant emphasis will be placed upon framing recommendations for settling the disputes in line with announced Government wage-price policy.

In short, the procedure essentially will be one of registering with the public a government opinion as to how far wages may be raised in the cases at issue without raising price ceilings. Both the General Motors and the Oil Panels stated, in quite explicit terms, that this was their conception of the job assigned them.

"Fact-Finding" in Auto and Oil Disputes

As the General Motors Panel phrased it: "This board subscribes to, and has been guided by, the national wage-price policy" — which it summarizes as calling for wage increases to maintain take-home pay at wartime levels, to the degree possible without inflationary price rises.

The Oil Panel was even more forthright in the statement of what it was supposed to do. "In the judgment of the panel," it declared, "the earnings of the workers must be as high as is consistent with both the maintenance of the stability of the price structure and the provision for reasonable returns to the owners of industry." In other words, prices and the return to investors are to remain fixed, with labor entitled to an ever-increasing return up to the limit of what the traffic will bear.

Having thus outlined their respective conceptions of the job, each panel proceeded to carry out its mission.

The Automobile Panel recommended that General Motors increase its basic hourly wage rates by 19½ cents, which amounts to about a 17½ per cent increase on the company's average hourly wage of $1.12. The Oil Panel recommended an 18 per cent increase in basic hourly wage rates, or an additional 21 cents to the average wage rate of $1.20.

The General Motors recommendation was based almost exclusively upon the Panel's calculation that a 19½ cent raise would keep weekly take-home pay equal to that earned in 1944 when the work-week averaged 45.6 hours. The calculation turned on an estimate of what the effective work-week was likely to be in 1946.

The Oil Panel's recommendation appears to have been based on a more complex but no more conclusive accounting. After calculating that the maintenance of July 1945 take-home pay after 40-hour shifts were restored would require a 22 per cent increase in straight-time hourly wages, it recommended that an 18 per cent increase be made. It accounted for 9½ per cent of this by noting that this was needed to cover cost-of-living rises, and explained that the rest was justified by a combination of factors including loss of premium overtime pay, higher productivity, and settlements already negotiated. Since the Panel gave no indication of the weight given to these several factors, it may not be unfair to assume that the last-named was given preponderant importance, since 18 per cent was the increase already granted in collective bargaining by Sinclair and certain other oil companies.

Higher Pay Without Higher Prices

Both panels stated that the pay increases recommended could be met without raising price ceilings, but neither documents its case on this score with very conclusive "facts".

The Oil Panel confined its observations on this account to the statements that only one company in its group had pleaded "inability to pay" and that the industry was in a generally profitable position during 1943 and 1944.

The Automotive Panel stated that, under a number of assumptions about the 1946 operations of General Motors which it believed to be valid, the Company would have higher earnings than it had in 1941, its previous record year. It specifically stated that its findings in the case were not applicable outside the

automobile industry, but it recognized that the General Motors settlement would more or less determine the settlements of other automotive companies. It stated that it had not been able to arrive at a clear conviction as to the ability of other auto makers to pay similar wage advances, but it dismissed the issue by observing that they could expect to operate at full capacity in 1946, and that this should provide savings to offset the increased wage expenditures.

From the management point of view, one of the most serious limitations in the panels' procedure was their failure to deal with any of the Company claims put forward. In ordinary collective bargaining the demands of both sides are advanced and concessions in one direction are traded for concessions in the other. Here, although the companies involved had insisted upon their need for guarantees against contract violations and wild-cat strikes, and for other union concessions, nothing but the wage issue was considered by the "fact-finding" bodies. The General Motors Panel specifically recommended that the wage increase of 19½ cents be granted, but that otherwise "the status quo prevailing before the strike be restored by the reinstatement of the 1945 contract between the parties." Handled thus, fact-finding becomes indeed a wholly one-sided exercise.

Both panels accepted, quite uncritically, the general position taken by Government spokesmen that wage increases are inflationary only if they are directly translated into price advances. It should be obvious that all wage increases add to the inflationary pressure, if made at a time like the present when consumer purchasing power far outstrips the volume of goods and services available to satisfy it.

"Fact-Finding" Dodged in Steel and Rails

It is ironic, too, that even while the Automotive and Oil Panel groups were holding the "government policy" line, the President and his Reconversion and Stabilization Directors were busily at work trying to dent it. In the steel dispute, although price rises in this industry have a particularly sharp inter-industry impact, hearings by the appointed fact-finding board were deferred while negotiations were carried forward by the President and his advisors under which the industry was offered a price increase of approximately $4.00 a ton on condition that U. S. Steel and the United Steelworkers agree upon a mutually acceptable wage boost. It is hard to avoid the cynical conclusion that wage increases constitute the major administration policy, and that the principle of not translating them into increased prices is sacred only in those cases where there can be some reasonably plausible showing that wages may be raised without price advances.

Much the same general conclusion — that the "facts" are controlling only if they support a substantial wage increase — is sustained by the history of the administration of the Railway Labor Act of 1926, often cited as a glowing example of how "fact-finding" by so-called Emergency Boards of Presidential appointees has served to prevent strikes on the railroads. It is true that reports of almost all of the 31 Emergency Boards appointed to look into threatened railway strikes in the 20 years since the act was passed have provided the basis for a settlement of the disputes in question. The fact — a real fact — remains, that in 1941 and again two years later the wage adjustments found appropriate by Emergency Boards in major railway labor disputes were revised upwards at the White House after the unions involved rejected them as unsatisfactory and threatened to strike. The second upward revision was made after government seizure of the railroads to prevent a national transportation tie-up. When the "facts" did not indicate a large enough wage increase to satisfy the union and the Administration, the "facts" went out the window.

It would be irresponsible to deny the importance of finding some tenable solution of current disputes that threaten to completely disrupt the reconversion process. But upon the evidence of experience, "fact-finding" boards cannot be expected to operate according to the common conception of their function — as agencies designed to sift out for the public an objective and significant weighing of the facts behind conflicting claims.

Without Principles Facts Mean Little

Facts, if they are assembled upon a sufficiently partisan basis, can be made to document almost any case one wishes to establish. The major difficulty in marshalling facts to resolve wage disputes is that there are no agreed-upon principles to determine the levels at which wages should be set. In the absence of such principles, it is inevitable that "fact-finding" boards, appointed by the Administration, manned largely by those who helped develop and administer Administration wage policies, and depending for technical assistance upon Administration Departments, will serve merely to implement Administration wage policy.

If Government means to reassert its wartime authority to fix wages — an objective specifically disavowed by the President and seemingly wanted by no one — it should accept the responsibility directly, rather than operate to that end through "fact-finding" boards which are independent in theory, but which cannot be so in fact.

The failure of the brand of "fact-finding" now urged upon Congress by the President is evident. Therefore, we must look for a solution along other lines.

What is needed is for labor and management to agree upon the principles that should govern the determination of wages under free collective bargaining. When such agreement is reached, then and only then, can fact-finding become an objective and useful instrument for settling wage disputes.

President, McGraw-Hill Publishing Co., Inc

THIS IS THE 44TH OF A SERIES

THE PRESIDENT'S WAGE-PRICE POLICY WON'T WORK

THE AMERICAN public had every right to expect that the long-awaited wage and price policy would break the impasse blocking the way to the swift and orderly reconversion of industry from war to peace.

The policy announced offers little promise of such solution, and this may well constitute a national calamity.

There is only one thoroughly constructive feature of the Presidential Statement of February 14 and its implementing Executive Order. It is the first Government pronouncement since the defeat of Japan to clearly define inflation as the major danger confronting us in the period immediately ahead.

That is a correct appraisal, and one long overdue. Up to now Government spokesmen, almost invariably, have sought to carry water on both shoulders. The Administration has justified its policy of promoting wage increases as a measure necessary to forestall deflation — to keep purchasing power from falling and forcing the economy into a violent tailspin. The strict holding-of-the-line on price ceilings has been defended as necessary to prevent runaway inflation. Unfortunately, while the President now exhorts all to enlist in a crusade against inflation with a voice that is clearly Jacob's, his program for dealing with it still employs the hairy hands of Esau to promote the very danger which he is urging everyone else to combat.

The "new" policy provides for a continuation of the wage increases that have been pressured through by Government mediators, "fact-finding" boards, and direct seizures until they have been made general throughout industry upon the dimension established in recent patterns. It offers industry the single concession of prompt hearings and decisions upon claims for price advances, but the yardsticks for judging such claims are exactly those which OPA has applied in the past. Since the past procedure has led us into our present difficulties, it is hard to see how it will serve now to lead us out of them.

Past Government Policy Fostered Dissension

At the war's end, it was obvious to everyone that what was needed was the swiftest possible reconversion of industry. It should have been equally apparent that we were faced with the difficult problem of controlling tremendous inflationary pressures which would be particularly insistent until peacetime production could be mobilized at high volume. This was made almost inevitable by the huge backlog of accumulated demand, for both capital and consumer goods, and by the unprecedented volume of liquid funds at the disposal of individuals of all classes. The only circumstance that could have modified the inflationary complexion of the postwar picture was the possibility of such wholesale and prolonged dislocation and unemployment in the process of readjustment that people would have been frightened into freezing onto their savings instead of spending them.

It soon was apparent that just the opposite was taking place. The early transition was extraordinarily swift, unemployment was lower than anyone had dared hope, and civilian spending outstripped all previous records. The circumstances called for strong anti-inflationary fiscal measures, along with a firm maintenance of price and wage controls alike.

Instead of adopting such a balanced program, the Government immediately discarded all wage controls, and in addition started an active campaign for promoting large wage increases. The President, upon a number of occasions stated flatly that American industry generally could and should grant substantial pay advances without any compensating price rises. His Office of War Mobilization and Reconversion estimated that average increases were practicable to the extent of 24 per cent. Given such Governmental encouragement, it was inevitable that labor leaders should do exactly what they did—file extravagant wage demands at the beginning of the reconversion process, when accurate appraisal of production schedules and costs were least susceptible of calculation, and when the shortage of civilian goods multiplied the inflationary effect of any increase in purchasing power.

At the same time, the OPA was fighting to hold the price line in a good cause, but with singularly inept procedure. It acted, seemingly, upon the premise that it was always better to give less price relief than was needed rather than enough, that relief provided under its formula was preferably to be granted later rather than on time, and that the interests of lower-bracket income receivers should be protected by a particularly tough resistance to raising prices of cheaper goods. The latter procedure seems to have boomeranged by virtually driving many of the lower-priced lines off the market.

The sum of these wage-price procedures resulted in work-stoppages of epidemic scope. Many business concerns faced with the prospect of immediately unprofitable operation, uncertain that new wage demands would not be made with Government support as soon as volume production was established, and without assurance as to when price controls would end, refused to assume inevitable losses even when confronted with combined union and Government pressure. The fight was on.

"New" Policy Differs Little From Old

With inflation now clearly recognized as the immediate danger, it might have been expected that the new wage policy would reverse the former practise of lending active encouragement to new wage advances. But that would have brought down upon the Administration the wrath of all organized workers who had not yet been granted increases already bargained through by other groups. This was avoided by directing the National Wage Stabilization Board in effect to approve any wage increases necessary to give general advances comparable to those already made. The only brake applied on the wage side lies in a directive to the Board not to approve, as a basis

for price relief, wage advances that go beyond the established pattern.

On the price side, the new directives to the OPA entail no important departure from its past procedures. Even the concession to review "hardship" cases promptly rather than after six months is only a pious hope, since it is unlikely that OPA is equipped to deal rapidly with the thousands of cases that will arise. A hardship case is defined as one in which, after absorbing an approved wage advance, an industry or establishment in a twelve months' period of normal-rate operation is judged by the Price Administrator likely to operate at a rate of profits to net worth less than it averaged in the base period of 1936-1939.

Let us see what this really means. In the first place, the rate of manufacturing profits in the base period was only moderate. But since the average net worth of manufacturing corporations has increased one-third over what it was in the base period, the application of the OPA formula, *assuming that its Administrator correctly appraises the twelve-month outlook*, seems to provide for absolute profits one-third higher than the 1936-1939 average.

The OPA formula, however, applies to profits *before taxes*. What really matters to stockholders is profits *after taxes*. Corporation taxes have been increased from an average of 17 per cent in the base period to 38 per cent now. This means that the price adjustments granted by OPA on average will yield profits *after taxes* no larger in dollar terms than in the 1936-1939 period, although 1946 manufacturing sales are expected to be more than twice as high. Under this procedure the *ratio* to net worth of profits *after taxes* will be one-fourth lower than the 1936-39 average. This clearly undermines the incentives upon which production at high level depends.

The workers get wage increases which promote inflation. The Government, bailed out from its previous mistakes, gets political credit for raising wages. And the entire bill is handed to American industry for payment.

But the Danger of Inflation is Real

Under these circumstances, there is a growing demand on the part of business groups that price controls be rescinded immediately. It is argued that, once the restrictive influence of price controls is relaxed, capacity production soon will supply sufficient goods to prevent undue price inflation.

It is understandable that business should wish to be rid of Government controls which have operated in such a thoroughly inconsistent and damaging fashion. Unfortunately, there is ground for believing that more harm might result from this cure than from the disease.

There is nothing in our situation that could bring on the kind of inflation that has been experienced by certain countries of Europe and Asia—in which the value of currency deteriorates until it takes a cartload to buy a pair of shoes. But our situation now is definitely more threatening than it was in 1919, after the first World War. At that time wholesale prices and the cost-of-living skyrocketed almost 25 per cent within twelve months. If we discard all controls now, as we did then, prices might easily go up from 25 to 50 per cent in a year's time.

An inflation of that dimension can do tremendous damage. While it lasts, all those dependent upon fixed incomes are damaged—all bondholders, including those who hold war bonds, all life insurance and annuity beneficiaries, all pensioners. Generally, the purchasing power of wages and salaries would shrink, with white collar and unorganized production workers hardest hit. Controlled-rate industries, such as railways and other utilities, would be squeezed. General business would suffer least of all—while the boom lasted.

But such soaring booms cannot last. The 1919 boom burst in mid-1920. By summer of 1921 industrial prices had fallen 40 per cent and industrial production was off 35 per cent; farm prices had fallen 50 per cent. This time the boom might soar higher and last longer, but that would merely result in an even more precipitous drop. Business would be hard hit along with everyone else, and high wage rates would mean nothing to the unemployed.

Controls Must be Consistent and Progressively Relaxed

But if the Nation cannot afford to risk disastrous inflation by immediately abolishing controls, neither can business afford to accept the program which the Administration now proposes.

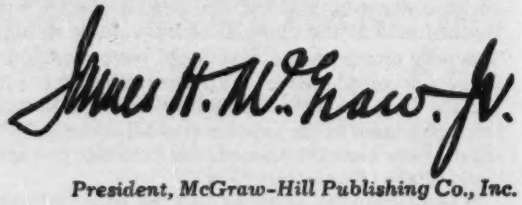
The wage-price policy will not hold the inflation line so long as the Administration is leading the assault to breach that line on the wage side, as it has done ever since VJ-Day.

The Administration is now going before Congress to ask for a broad extension of its wartime powers for an additional year beyond June, 1946.

Congress must see that this is not granted except upon terms that guarantee the use of such power with a consistency that has been conspicuously absent up to now.

1. It must provide sufficient price relief to yield profits normal to high-level operation.
2. The basis for price relief must be clearly defined and geared to actual costs of operation at the earliest possible date.
3. OPA administrative procedures must be speeded-up and streamlined, or the delays that characterized past administration will become intolerable.
4. It must see that, once established, the new line is held as long as wartime controls are continued by enforcing restrictions on wages as well as prices.
5. It must set an early date for the termination of all wartime controls and provide for progressive and bold steps for de-control to be taken before that date, as soon as production levels in any field are sufficiently high to restrain runaway prices.
6. It must proceed without delay to marshal fiscal and monetary policies to combat inflation, in order that price controls may be discarded at the earliest possible date.

Unless Congress does this—and it will not be easy in an election year—we are headed for an explosion. It will come in one of two forms—either in a continuance of industrial strife, or in a rocketing inflationary boom that can only end in collapse and depression.



President, McGraw-Hill Publishing Co., Inc.

LOAN TO BRITAIN

... *Investment in World Economic Unity*

CONGRESS should give swift and confident approval to the proposed loan to Great Britain.

Few other issues of foreign policy in the present troubled world lend themselves to such clear appraisal of where our National interest lies.

In simplest terms, the question is whether we should extend to Great Britain a credit of $3¾ billions (plus $650 millions in payment for lend-lease balances) in return for her promise to repay principal with interest over a fifty year period starting at the end of 1951, and her pledge to give the fullest possible support to the kind of world trading system which it is the declared policy of both the United States and the United Nations Organization to promote.

We Can Afford to Make It

The sum we hazard is not inconsiderable, but financial risks have meaning only when related to resources. The line of credit provided by the loan will amount, at most, to a claim on 2/5 of 1 per cent of our gross output for the five to six year period over which it may be used. The interest rate charged, while moderate, is higher than our Treasury is paying upon current borrowings. The risk entailed is well within our resources as a creditor. In the considered judgment of the American and British technical experts who thrashed through the intricate accounting for three painful months, the amount and terms offered will suffice to allow Britain, under rigid austerity, to relax her system of foreign trade restrictions, and to expand exports sufficiently to pay her debt commitments.

Against the considered risks of extending the loan, there must be weighed the certain costs of refusing it. Without the loan, Britain has no recourse but to maintain and extend the system of bloc trading which she adopted under stress of world depression and world war. If that is the route Britain follows, she will carry with her a large part of the sterling area countries – all British Commonwealth and Empire countries (except Newfoundland and Canada) plus Egypt, Iraq, and Iceland—and many of the nations with which the United Kingdom has payment agreements (Argentina, Bolivia, Brazil, Chile, Paraguay, Peru, Uruguay, Belgium, Czechoslovakia, Denmark, Finland, France, Netherlands, Norway, Portugal, Spain, Sweden, and Turkey).

Altogether, the United Kingdom's orbit accounts for more than half of the world's imports and exports combined. It likewise is crucial to the trade of the United States. In the years immediately preceding the war, the sterling area and payment-agreement countries provided just under one-half of both the import and export trade of this country.

Russia, of course, will continue to conduct her foreign commerce exclusively upon a state-trading basis. Before the war, the Soviet Union transacted only a little more than 1 per cent of foreign trade business, but its future sphere of influence will be large—conceivably embracing as much as 30 per cent of total international trade.

We Cannot Afford to Refuse It

If the weight of British influence in foreign trade is thrown toward the Russian pattern rather than toward ours, it is apparent that bloc trading, with all of is supporting devices—bilateral deals, exchange controls, import and export quotas, subsidies, currency manipulations and the like —will be the prevailing pattern for foreign transactions.

In self-protection, the United States would have no alternative but to conform to the dominant pattern. We should be forced to form our own bloc, and to enter into active economic warfare in bidding for trade concessions against the offers of our rivals. How well we would do this is problematical. To the game we would bring the largest economic potential in the world. But our handicaps would be equally impressive.

First, under a system in which political and economic motivations are inextricably fused, a democratic nation, and particularly one with a tradition of freedom in its domestic enterprise, would operate at a great disadvantage. We should inevitably be driven toward more and more government control of our entire economy.

Second, with a pattern of foreign trade in which our exports habitually are greater than our imports, our bargaining position in international trade is much weaker than our over-all economic strength would suggest. Under state-controlled trading we should still find it difficult to compete successfully without resort to loans, and under these conditions our loans would be supporting a system alien to our choice and interest.

Third, under a regimented system which made economic decisions subservient to political considerations, it is virtually certain that the volume of world trade would shrink. That was the clear experience of the nineteen-thirties. Thus, the

standard of living in the United States would suffer in common with all others, and we would be forced into a particularly drastic curtailment of certain war-expanded segments of our economy, at the very time when a large portion of the world is most in need of the products they can produce.

Weighing the Alternative Costs

In the years immediately ahead it is certain that from two-thirds to three-quarters of all international trade will be transacted either in pounds or dollars. If both circuits are linked in a determined effort to restore competitive world markets, to which buyers and sellers alike have access without discrimination, that will be the dominant system of foreign trade. If the sterling group with its satellites organizes a closed grid, our exclusive effort cannot preserve the trade pattern that we believe offers most to us and to the world.

No one can accurately measure the costs to the United States of refusing the loan and accepting the consequences. But unquestionably they would dwarf to insignificance the sum risked in the proposed credit. We would lose through the shrinkage of our trade, through the wrench of violent readjustments in our production patterns, and eventually through the curtailment of our over-all output below what it would be under an open rather than a closed system. We would lose heavily in economic liberty under a procedure that can be followed with success only by a close regimentation of production as well as trade.

Most of all, we would lose in prestige, through demonstrating that we are still unprepared to exercise a world leadership to which our giant stature as the possessor of almost half of the world's economic capacity entitles us. Once again we would be exhibiting to the world political feet of clay supporting an economic frame of heroic proportions.

It Is Far from a "Soft" Bargain

There has been some disposition in this country to regard the loan to Britain as a somewhat "soft" and generally unprecedented transaction that smacks of charity. This is the sheerest nonsense.

In the first place, the kind of economic system we want has never functioned and cannot operate now without a lender. For many decades prior to World War I Great Britain filled the creditor role. In 1913 her foreign investments totaled $19 billions, and she not only made such transactions pay, but they proved her salvation through two grim wars. Her credits helped in the industrial development of a large segment of the world, including the United States. Of all the nations in the world, only the United States can assume now the mantle which Britain no longer can support.

In the second place, the terms of our proposed loan to the United Kingdom are far from easy. Britain put a substantially greater proportion of her relatively meager resources into the war than we did, and dissipated a large share of her foreign holdings in the process while accumulating an outside debt of crushing magnitude. On a per capita basis her internal debt is greater than ours. Many Britons feel that our proposed loan is too small, and its terms too rigorous. If the amount proves to be inadequate, we shall have to consider supplemental aid at a later date. But the majority believe that the present offer gives a fighting chance to restore the system of world trade that we and they both want, and upon which the World Bank, the Monetary Fund, and the International Trade Organization under United Nations aegis are based. It is certain that without our loan all of this will go by the board.

In the third place, our proposed loan is far from being without precedent. Canada, which is linked by far closer economic ties to us than to the Empire, already has provided for a loan to Britain of $1,200,000,000. This amounts to almost a third of what we propose to lend, although Canada's population is less than 10 per cent, and her income is little more than 5 per cent of ours.

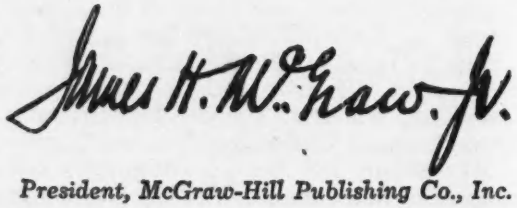
Shall the United States Lead or Follow?

The way to exercise leadership is to lead. Nothing could be more futile than to go half way toward establishing the economic order for which we stand, and then withhold the crucial measure that will make it work. Failure to approve the loan to Britain will be a clear default of leadership. Failure to approve it promptly will dissipate its effectiveness.

It has been officially stated that the British loan is a unique case that will establish no precedents for further credits to other nations. It is exceptional in its importance to our aim. But if the United States expects to make its economic program the dominant one for world trade, it must continue to exercise the creditor function without which that program cannot persist.

The most that we should ask is that future loan transactions be scrutinized as was this one to see that they offer comparable security and comparable return in support of the program for which we stand.

For the loan to Britain, it can be said that never before has one nation had an opportunity to gain so much at so little risk as has the United States in this uniquely decisive case.



President, McGraw-Hill Publishing Co., Inc.

THIS IS THE 46TH OF A SERIES

HOUSING CAN COST TOO MUCH

EVERYONE in the United States wants our people, and particularly our war veterans, well housed quickly. Almost everyone, we believe, likes the vigor and imagination with which Wilson W. Wyatt, the housing expediter, is going about the job of mobilizing our housing resources.

No one, however, wants the veterans, or anyone else, to get a lot of severe economic headaches along with the housing. As it stands, the emergency housing program runs unnecessary risks of having such results.

Here are the reasons:

1. The principal opportunity the program offers to the veteran is that of buying a high-cost house where a chance to rent would, more often than not, meet his needs much better.

2. At the worst possible time, the program adds substantially to the dangers of a runaway inflation of the sort that inevitably ends in a crash.

3. Little is done to try to reduce the arbitrarily high costs of building, such as those resulting from restrictions imposed by labor unions and antiquated building codes.

4. By giving overriding priorities to unattainable goals of home construction, the program endangers a volume of industrial construction necessary to sustain full employment.

Needs of Veterans

First on the needs of the veterans. What many, if not most, veterans need is a chance to rent a place at a reasonable rental while they are getting shaken down in their postwar careers which in many cases are inevitably unsettled at this time. Essentially, what the "Veterans Emergency Housing Program" gives them is a chance to buy, for about $6,000, a house built along conventional lines and padded with much unnecessary labor and material cost.

But what are the alternatives? There are at least two. One is to put far more emphasis on more effective use of existing housing than the Wyatt program has thus far. The other is to see that the proportion of new rental units is much stepped up.

Incredible as it may seem, there are at present more than 2,000,000 vacant dwellings in the United States. Many of them should be demolished. But many permit of relatively satisfactory temporary use. Many more single dwellings can readily be converted into comfortable multiple dwellings. The emergency program assumes that only 350,000 dwelling units can be provided this year by these expedients, but it does not seem unreasonable to assume that this figure might be doubled by a vigorous drive. The result would be a better balanced emergency housing program, because it would provide more rental housing immediately and save critical building materials.

Of the new housing units contemplated by the Wyatt program, it is estimated that only about 20 per cent will be for rent. Before the war more than half of the homes in the United States were rented. That means that unless the Wyatt program is to create little less than a revolution in the terms on which homes are occupied, it must be revised to include a much higher proportion of rental units.

To secure the result in the face of present high building costs special inducements will be required. They might be provided by allowing accelerated tax amortization of, say, half the construction cost over the next five years, together with rent ceilings high enough to make this form of investment attractive. This would, of course, call for higher rents, but the actual price to the veteran, in woe as well as money, might well be much less in the long run than if he bought an over-priced house now.

Too Easy To Pay Too Much

One of the mysteries of the Wyatt program is its general emphasis on measures to increase the supply of money with which to buy houses when the demand for houses is already at an all-time high. Some veterans may need special financial help, but the plan to give 90-95 per cent mortgages generally on new homes is not only unnecessary but positively dangerous. By providing up to $3.5 billions of government-guaranteed credit for homes this year, and almost twice as much in 1947, the program will release an equivalent amount of individual savings to create further demand for goods and services. All that such generous mortgage terms will accomplish with certainty is a dangerous lengthening of the odds that we will not avoid a boom and bust cycle of inflation.

If building codes were brought up to date and arbitrary union working restrictions were eliminated, the way would be paved for reductions in the price of standard houses which, it has been estimated, might run as much as 20 per cent. This would both give the buyer of a new house a far better run for his money, and also reduce the inflationary pressure created by the super-generous credit arrangements involved.

Getting anything done along this line is difficult, particularly because the restrictions are imposed by tens of thousands of separate localities and organizations. Some headway is being made. The local emergency housing committees being set up under the Wyatt program provide a means of doing much more. Far more steam must be put behind this aspect of the program, however, if its greatest potentiality for permanently constructive accomplishment is to be realized.

Crippling Essential Industrial Production

The goals set for emergency housing construction —1,200,000 new homes started this year and 1,500,000 started in 1947—are higher than any qualified authority thinks can be met without crippling other essential construction. The reasons commonly assigned for such optimistic goals is that they are inspiring to those in the industry and soothing to those who want something tremendous done about housing.

Under normal circumstances, relatively little damage might be done by such excessive goals which are a common feature of most Washington programs trying to elbow their way to the center of the national stage. However, the emergency housing program carries with it top priorities for the materials to be used. Consequently, other essential construction will have to get along on whatever share of critical building materials will be left after all demands of home builders have been satisfied.

The Civilian Production Administration estimates that output of important materials will fall far short of needs. It forecasts a 15 per cent deficit in lumber, 18 per cent in bricks, and 52 per cent in cast iron radiators. Hence, unless building materials output can be stepped up far more rapidly than now seems possible, a prohibitive squeeze will be put on industrial building to provide the materials needed for the Wyatt program. This would complicate unbearably the problems of sustaining full employment and getting the flow of production so important in avoiding the boom and bust route.

Perspective on the Housing Shortage

What is needed is an aggressive drive to get full production of building materials as rapidly as possible. Such a drive should concentrate on measures aimed at helping the industry remove the obstacles to all-out production rather than on such measures as the subsidy plan which seems quite likely to succeed only in enmeshing the industry in more government controls. After making due allowance for the materials outlook and the needs for essential non-housing construction, housing goals should then be set as high as feasible. As matters stand, by setting construction goals before feasible material goals are determined, the cart is put before the horse.

There can be no doubt about the acuteness of the housing shortage and the necessity of a program commensurate with the magnitude of the problem. It also remains true, however, that the housing shortage for the nation as a whole is not quite as desperate as those who want the country to drop everything and go to building houses would have us believe.

During the war 3½ to 4 million new dwelling units were built or created by remodelling in other than farm areas. The number of families living in such areas increased by less than 3½ million. Even though some of this housing was located in remote places as an adjunct of war production work, the wartime increase permitted a margin for more housing per family at this time. Indeed, it has been estimated that the rate of doubling up is only about one-third as great as in 1940. The margin did not begin to suffice, however, to meet the needs of those millions of people particularly in the lower income groups who, thanks to rapid increases in income, can afford to have and insist upon having better housing than they have ever had before.

A rising standard of income which makes possible a new standard of housing for many people is a fine thing. Above all, it is important to see the veterans get the best possible break in housing.

But Housing Can Cost Too Much

The Wyatt program has many good features. The emphasis on prefabrication, though perhaps overoptimistic, is hopefully modern. The emphasis on local collaboration in solving housing problems which are inevitably in large part local should lead to permanently valuable results. The vigorous mobilizing of 300,000 temporary dwellings to meet at high speed some of the most desperate shortage is all to the good.

The main trouble with the program is that it does not pay enough attention to the economic havoc which may be created in the process of trying to meet its excessive goals. As a nation, we should be and are willing to pay a high price to get adequate housing. But the price will be too high if we:

1. Give the veteran a bad bargain by selling him an over-priced house.
2. Cripple industrial production needed to create good jobs for veterans, and
3. Touch off a disastrous inflationary sequence in the process.

These pitfalls can be avoided. All of us, including the veterans, have a common interest in seeing that they are avoided.

President, McGraw-Hill Publishing Co., Inc.

Congress has acted—and along these lines—since this editorial was written. If the President signs the legislation, we have taken one step forward. If he vetoes it, the voters must resolve a conflict between two branches of their government.

THE LABOR CRISIS
—*it's up to Congress*

IT HAS remained for John L. Lewis to demonstrate conclusively that, under the sponsorship of the federal government, the power of organized labor has been built up to a point where it can be used to paralyze the economic life of the nation. Therefore, in the elemental interest of self-preservation, the first order of the day is to cut down the power of organized labor to a point where irresponsible leaders no longer have the power to use it to cut down the country.

This will prove an exceedingly complicated job. The federal government, over a dozen years, has developed and buttressed the power of organized labor by many separate steps. They are interlaced in a pattern which cannot easily be unravelled.

Cutting down the power of organized labor to proper proportions will be an operation almost as delicate as brain surgery. To be successful it must impair no basic American political or economic right. It must leave intact the right of workers to organize and bargain collectively through representatives of their own choosing. It must leave intact the right to strike. But it must disassociate from the exercise of these rights opportunities for devastating abuse of the public welfare such as those demonstrated by Mr. Lewis. A meat axe is not the instrument for this operation.

Because of the complexity and delicacy of the operation to be performed it would be helpful if it could be carried out in a tranquil atmosphere. The urgency of the problem is such, however, that no time can be lost in getting at it.

Guiding Principles

However, the dangers that haste or heat will lead to serious blunders can be largely eliminated if the process of bringing the power of organized labor back within safe and reasonable bounds is governed by principles to which all fair minded people can fully subscribe.

The most important of these principles is that it is an abuse of public authority to extend special privileges to organized labor.

When in 1935 Congress passed the Wagner Labor Relations Act, one of the great buttresses of the power of organized labor, it was upon the explicit theory that organized labor was weak and needed coddling by the federal government if it were to survive, let alone grow big and strong. In the policy section of that act it was stated that "the inequality of bargaining power between employees who do not possess full freedom of association or actual liberty of contract, and employers who are organized in the corporate or other forms of ownership association substantially burdens and affects the flow of commerce . . . "

Regardless of whether or not that was a correct reflection of the situation in 1935, it bears no relation to the situation today. Under the continuous sponsorship of the federal government, the power and bulk of organized labor has waxed until today it is preposterous to regard it as the weak sister in its bargaining with employers. If, after being continuously demonstrated since V-J Day, the proposition that the pendulum of organized power has swung too far over on the side of organized labor needed any final and clinching demonstration, John L. Lewis provided it.

Changes in the Law

Translation of the principle that organized labor is no longer a weakling, requiring a diet of special privileges, into specific legislative enactments is a detailed technical operation beyond the scope of this statement. It is possible, however, to indicate some of the general lines it should follow. Here they are:

1. The duty to bargain collectively, now imposed upon employers by the Wagner Act, should also be imposed upon the leaders of organized labor who are now under no legal compulsion to bargain.

For well over a month Mr. Lewis made a complete mockery of the process of collective bargaining by refusing even to state his demands until the coal operators had approved "in principle" a plan for a miners' "health and welfare" fund which he fancied. In the meantime the country was plunged into an ever deepening crisis.

2. Unions, as well as employers, should be made liable to suit for damages for breaking their collective bargaining agreements.

A degree of responsibility commensurate with their age and power requires that unions be liable, to the extent of union funds but not the funds of individual members, for carrying out their agreements. To have it otherwise is to hold that a collective bargaining agreement is, by defi-

nition, a phoney agreement so far as the union is concerned. Outlaw strikes are the fruit of this lop-sided arrangement.

3. Employers should be given more discretion, in reinstating employees who have gone on strike than is now permitted by the Wagner Act.

The Wagner Act largely eliminates the risks involved in striking because of the requirements it imposes upon employers to take workers back when they have decided to return to work. These requirements make it virtually impossible for the employer to replace workers even if they are engaged in the most unjustifiable of strikes. At the least workers who have smashed up property and stirred up violence in the course of a strike should have no rights under the Wagner Act. How much further the Wagner Act straitjacket should be loosened at this point should be carefully explored, and excesses encouraged by the Act should be removed.

4. The wedge which the National Labor Relations Board has driven into the orderly conduct of American industry by holding that foremen are covered by the Wagner Act should be eliminated.

The issue involved here is continuously mislabelled and confused as that of the right of foremen to organize. There is no question of the right of foremen to organize any kind of a legal organization they desire. That is their right as American citizens. The issue is whether or not the special privileges accorded by the Wagner Act, which in some circumstances has been so construed as even to prevent employers from talking with their workers, should be extended to foremen who, if American industry is to have a chance to do its duty effectively, must represent management with full loyalty and responsibility.

A member of John L. Lewis' United Mine Workers takes an oath which provides, in part, "that I will not reveal to any employer or boss the name of anyone a member of our union" and will "defend on all occasions and to the extent of my ability the members of our organization." Mr. Lewis insists that the coal operators contract to deal with foremen to be organized in a union where they will take that oath, and where their activities will be separated from the influence of employers by the barriers imposed by the Wagner Act. Such an arrangement undercuts orderly management of American industry.

5. The exemption of labor unions from the federal anti-trust laws, provided when organized labor was presumed to be weak, should be modified to take account of its vastly increased strength, and the use of this strength to destroy business enterprise and create monopoly.

As matters stand unions can run employers completely out of business by secondary boycotts and run fellow workers out of jobs in the process. An Ohio manufacturer, working with a government-certified C. I. O. union, is put out of business because A. F. of L. workers refuse to handle his products. Still the government, this time in the person of the United States Supreme Court, says that actions of this sort are above the law because Congress exempted unions from the federal anti-trust laws.

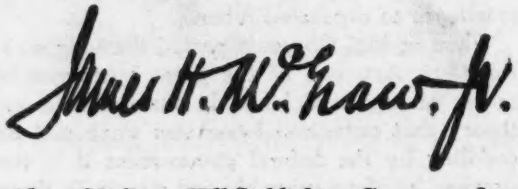
To eliminate one of the most devastating forms of restraint of trade, this exemption should be cut down forthwith by subjecting unions imposing secondary boycotts to the same penalties under the federal anti-trust laws as those to which employers doing the same thing are subjected. And the question of further narrowing the obsolete exemption of unions from the federal anti-trust laws should be fully explored.

6. The levying of special sales taxes for the exclusive benefit of unions should be prohibited by law.

As a matter of good government the right to levy consumption taxes should be reserved to the public authorities and used strictly for public purposes. As a matter of good economics, payments to workers or their organizations should be included in the payroll where they can be properly counted as part of the cost of production.

Equality Before the Law

When everything that can conceivably be accomplished by legislation has been accomplished there is no reason to believe that an ideal or even a surely workable system of industrial relations will have been devised. Many of the mainsprings of such a system lie deep in the hearts of men and far beyond the reach of legislation. There is no chance, however, of having such a system, or even a defensible system of democratic government until special privileges which tip the scales of power far on the side of organized labor are withdrawn and there is some measure of equality for employers and organized labor before the law. Though it is hard to believe it at the moment the country may come to be grateful to John L. Lewis for driving that lesson home so ruthlessly.



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Construction Trends

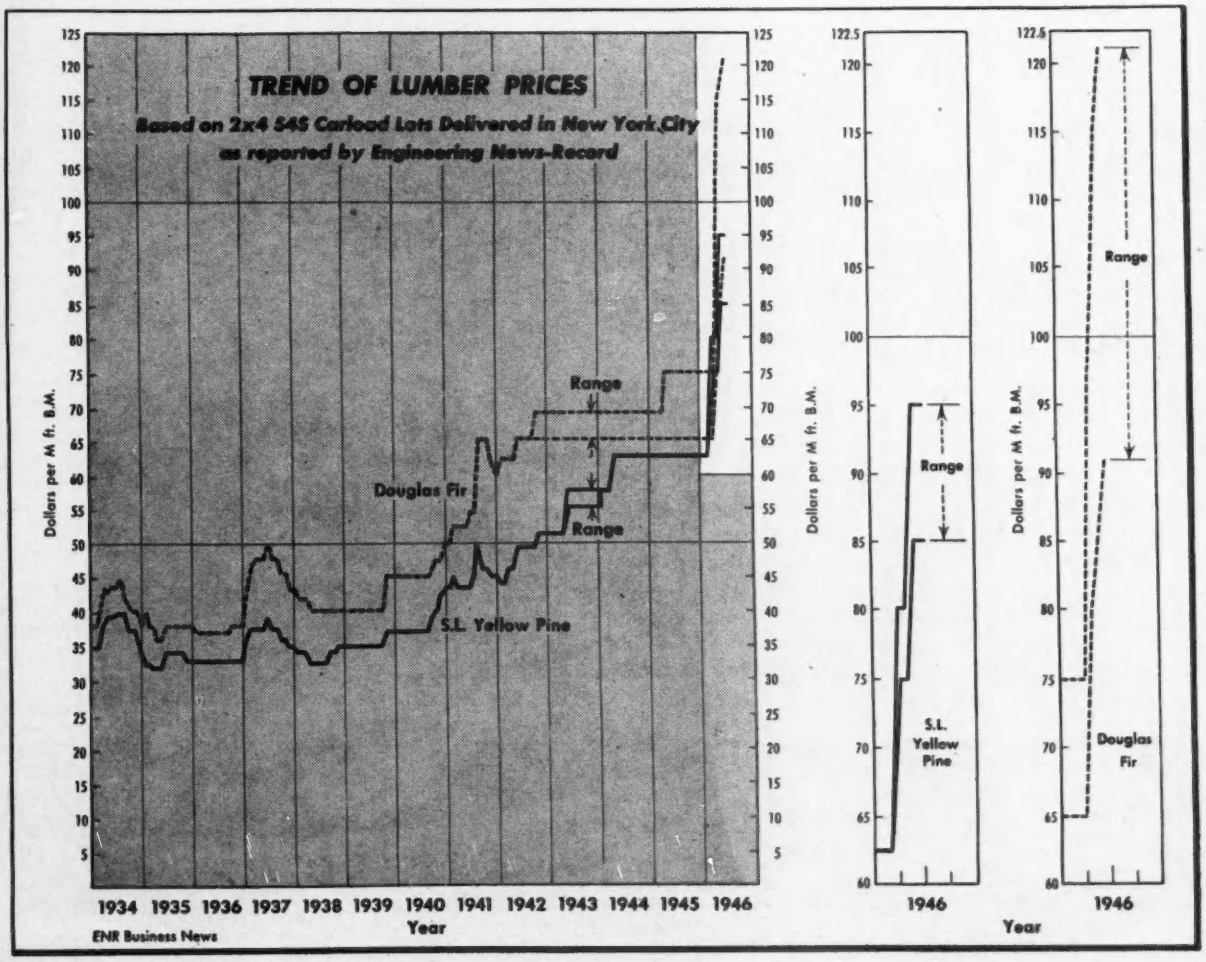
New York Lumber, Scarce, Sets Price Record

Current prices of 2x4 lumber delivered in the New York area have reached a new high of $85 to $95 for Southern Pine and $91 to $121 for Douglas Fir. However, due to disruption of normal distribution channels, very little lumber is available.

Two methods of building up the price structure per M ft. B.M. of Douglas Fir are used. Components of the first method are: mill price, $37; freight to New York, $25; dealer handling, $5; 30% markup, $20; and truck delivery charge, varying from $3.55 to $32, resulting in a range of price to contractors of approximately $91 to $119. Varying delivery charges are due to the fact that some companies charge $32 per truckload whether the truck is loaded to average capacity of 9,000 ft. or partially empty. The second method differs in that dealer's handling cost and markup is a set charge of $25, and the trucking charge is figured at the rate of $1.75 to $5.00 per M ft. B. M., depending upon distance of hauling.

Another cause for range in prices is that very little 2x4 lumber has been manufactured at mills recently. More often timbers are shipped and cut down to size enroute, resulting in additional loading charges and higher markups. Contractors are also forced to purchase larger sizes and cut down to their needs.

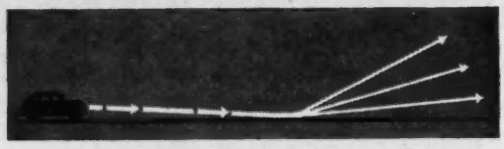
Lumber is scarce in New York because dealers buying at ceiling prices cannot pay as much as the mill can receive by selling through other channels. Mills sell directly to trucks at an increase of $6 over the price of dealers. Other increments over the mill price to dealers are $15 to railroads and a 10% premium for export lumber. Results are that New York dealers are able to secure little lumber for local markets.



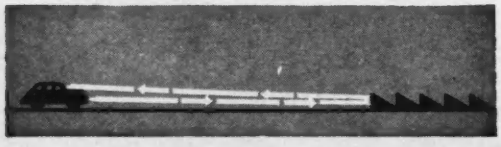
White Concrete Reflecting Curb defines the road-edge by day... be-ribbons it with light at night. That's because the scientifically designed saw-tooth faces catch headlamp rays, reflect them back to the driver... and thus create a bright white guide to safety!

Easily installed in any road—old or new—the body of the curb is made of gray cement concrete... with an outside facing made with Atlas White Cement. For cast-in-place curb, a simple hand tool imparts the scored profile.

The factor of safety provided by White Concrete Reflecting Curb is permanent. It is built into the curb by the scored facing. It is economical, too... because the curb of unlighted roads is illuminated at night primarily by reflection from the driver's headlights. Send for full details. Write to Atlas White Bureau, Universal Atlas Cement Company (United States Steel Corporation Subsidiary), Chrysler Bldg., New York 17, N. Y.



A smooth curb (above) wastes the car's headlights. It reflects them away from the driver. A White Concrete Reflecting Curb (below) conserves this light. It reflects the light from headlights back to the driver. Thus a smooth curb is barely visible at night, while a White Concrete Reflecting Curb stands out—bright and clear.



ENR-RM-46

A UNIVERSAL ATLAS PRODUCT

ATLAS WHITE CEMENT

For White Concrete Reflecting Curb

U. S. STEEL RADIO SHOW — Sunday Evenings — Consult your local newspaper for time and station.

When you buy a SHOVEL CRANE or DRAGLINE

LOOK at these crawlers!

THERE *is* no other crawler like this! The crawler base is a heavy annealed steel casting proved in years of service. All travel gears are fully enclosed and run in oil. Alternate lugs on tread shoes give a self-cleaning action. A ball and socket action between roller and tread distributes the bearing pressure more evenly. The idler sprocket is without teeth, eliminating the jerky action common to ordinary crawler drives. Joints between treads are closed and smooth, eliminating the "nut cracker action" that chips tread shoes.

Half-length floating pins simply locked in, reduce wear and replacement in tread shoes. And most important of all—positive traction on both crawler belts while turning as well as when going straight ahead, on all the larger Northwests, assures full traction when you need it most, enabling Northwests to go where others have difficulty.

Plan well ahead for your Northwest. Let us send you details on the size that interests you.

NORTHWEST ENGINEERING COMPANY

1727 Steger Building • 28 E. Jackson Boulevard • Chicago 4, Illinois

If you have a REAL ROCK SHOVEL you never have to worry about output in dirt!

NORTHWEST

SHOVELS • CRANES • DRAGLINES • PULLSHOVELS

LONGER WEAR....SAFER JOB PROTECTION

Highly resistant to wear and impervious to weather, MT. VERNON Extra Duck gives you long wear and safe job protection. Made from top grades of cotton and woven to a high degree of uniformity, it has strength and weather shedding qualities . . . a toughness that makes it stand up under the roughest kind of handling. For tops in tougher tarps, specify MT. VERNON Extra Duck.

TURNER HALSEY
COMPANY
Selling Agents
40 WORTH ST. • NEW YORK

MT. VERNON-WOODBERRY MILLS

Branch Offices: CHICAGO • NEW ORLEANS • ATLANTA • BALTIMORE • BOSTON • LOS ANGELES • SAN FRANCISCO

BYERS WROUGHT IRON PIPE *Safeguards* this new outfall line

Seagirt is the latest New Jersey community to install a sewage outfall line . . . and to safeguard it against punishing service conditions by using Byers Wrought Iron pipe. Extra heavy 12-inch black beveled pipe was used, with each joint reinforced with split sleeves made from 14-inch OD wrought iron pipe with ½-inch wall. Joints and sleeves were welded on shore, and the line towed out to sea as the work progressed. Installation was handled by Thomas Proctor Company, Inc. of Long Branch, New Jersey.

Outfall lines are doomed to a rough life, and the use of anything but the most durable material invites unnecessary trouble. There is continuous corrosive attack from sewage within and sea water without, abrasion from sand, and stresses and strains from currents and tides. Often a shift in the bottom may leave long spans unsupported, so that structural strength is highly important.

One instance of wrought iron's unusual service qualities came to light when a municipality outgrew its wrought iron 12-inch line, then twenty years old. The pipe was found in such splendid condition that the new line was immediately specified "wrought iron." Installations still serving after 50 years have been reported.

There is a definite reason why wrought iron serves so well in this punishing application. It is found in the unique structure and composition of the material. Tiny fibers of glass-like silicate slag are threaded through a matrix of high-purity iron. These fibers halt and diffuse corrosive attack, discouraging pitting. They also help to anchor the initial protective film, which shields the underlying metal.

If you have any outfall lines in mind, you will find some helpful ful information in our bulletin, "Wrought Iron for Sewage Treatment and Disposal Installations." We will be glad to send you a complimentary copy on request.

A. M. Byers Co., Pittsburgh, Pa. Established 1864. Boston, New York, Philadelphia, Washington, Atlanta, Chicago, St. Louis, Houston, Seattle, San Francisco.

CORROSION COSTS YOU MORE THAN WROUGHT IRON

BYERS
GENUINE WROUGHT IRON
TUBULAR AND HOT ROLLED PRODUCTS
ELECTRIC FURNACE ALLOY STEELS · OPEN HEARTH ALLOY STEELS
CARBON STEEL TUBULAR PRODUCTS

BUY BRADEN - They are Safer

BRADEN WINCH COMPANY
1001 East Admiral Boulevard

BRADEN Winches

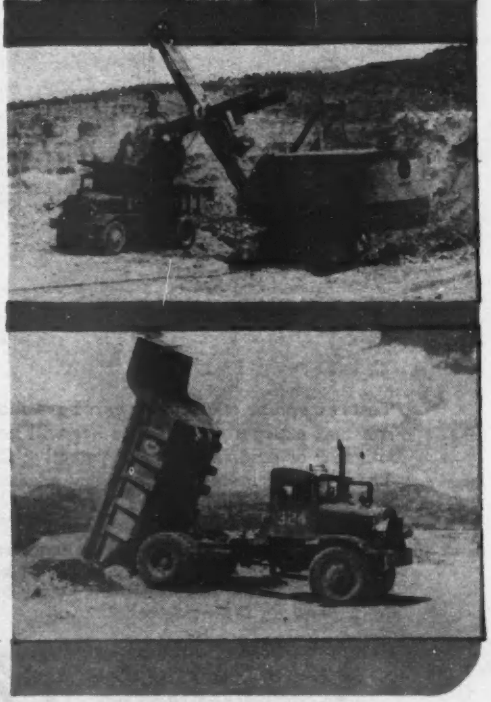
TULSA 3,
Oklahoma

The Isbell Construction Co. of Reno, Nevada is moving about 30,000 tons of overburden every working day of fifteen hours at this big open pit operation for one of the large copper producers in eastern Nevada.

Loaded by 2½ cu. yd. shovels, 23 Rear-Dump Euclids carry full 15-ton loads on hauls up to one mile in length. Working at an altitude of approximately 7,000 ft. the Euclids have plenty of power and speed for the long hauls and maximum adverse grades of 8%.

A leading contractor in the West, Isbell Construction purchased 10 Rear-Dumps of 15-ton capacity in 1943 and now has a total of 23 Euclids. Coming from men who know equipment and use it on the toughest jobs, these repeat orders are evidence of the efficient and reliable performance that is built into every Euclid.

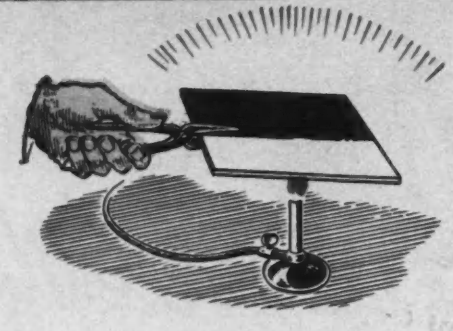
Write for facts and figures on what Euclids can do for you on present or future work.



The EUCLID ROAD MACHINERY Co.
CLEVELAND 17, OHIO

"Flintkote Hydralt* Protective Coatings Win on Four Separate Counts"

*Hydralt is the brand name for Flintkote Industrial Asphalt Emulsion Coatings of the stable, static, non-flowing, non-staining, mineral colloid type.



1 HEAT RESISTANCE

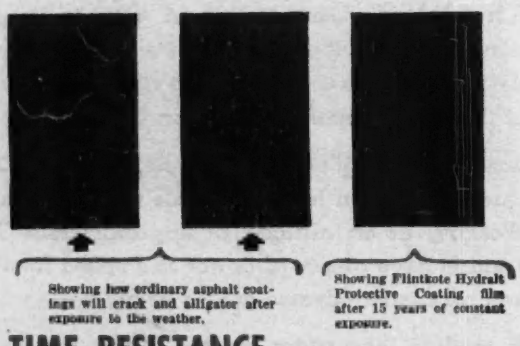
Flintkote Hydralt Protective Coatings are applied cold. The dried film will not melt or flow at high temperature... even when a Bunsen Burner is directed against the back of a steel plate coated with the emulsion.

2 COLD RESISTANCE

These stable asphalt emulsions remain resilient and will not crack at low temperatures. Moreover, Hydralt Coatings have plenty of flexibility to stand the shock of quick-changing temperatures.

3 WEATHER RESISTANCE

Tests extending over many years have shown that constant exposure to the weather will not craze, alligator or oxidize Hydralt Protective Coatings. They protect metal and masonry against corrosion, smoke and acid fumes.



Showing how ordinary asphalt coatings will crack and alligator after exposure to the weather.

Showing Flintkote Hydralt Protective Coating film after 15 years of constant exposure.

4 TIME RESISTANCE

As a dampproofing, waterproofing and corrosion prevention material exposed to weather, Hydralt Protective Coatings outlast any other form of bituminous coatings.

And remember, Flintkote Hydralt Emulsions are free from volatile fumes. Odorless... fire resistant... quickly applied *cold*. Used indoors and out, in expanding industrial applications. Other famous Flintkote products are Flintkote Flooring Emulsions for heavy-duty asphalt mastic—the ideal, modern wearing surface for old or new floors. Send for literature today.

Flintkote-Products for Industry

THE FLINTKOTE COMPANY · INDUSTRIAL PRODUCTS DIVISION

Atlanta · Boston · Chicago Heights · Detroit · Houston

FLINTKOTE INDUSTRIAL PRODUCTS

30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

Los Angeles · New Orleans · Washington · Toronto · Montreal

GRINNELL

PIPING PROGRESS

Valves for Refrigerant Gases

Question: **Why is a diaphragm valve best suited for the control of Freon and other refrigerant gases?**

Answer: **The diaphragm seals against leakage of gas under pressure or in-leakage of air under high vacuum. Diaphragm must be impervious to destructive action of the gas.**

The above cross-sectional view of a Grinnell-Saunders Diaphragm Valve shows how the molded diaphragm of special rubber compound, unaffected by refrigerant gases, prevents the loss of gas under pressure or the in-leakage of air under high vacuum conditions.

WHENEVER **PIPING** IS INVOLVED

No single type of piping material is suitable for the wide variety of operating conditions encountered in modern process industries. The Grinnell-Saunders Diaphragm Valve typifies the extent to which this company goes to solve the piping requirements of hard-to-handle liquids and gases.

The development of such piping specialties calls for wide piping experience, continuous laboratory research and skilled field engineering – the kind of a background that Grinnell brings to the job from 95 years of piping experience. As specialists in piping, Grinnell can supply everything from a tiny tube fitting to a complete power or process piping installation.

GRINNELL COMPANY, INC. Executive Offices, Providence 1, R. I. Branch warehouses in principal cities. Manufacturing Plants: Providence, R. I.; Cranston, R. I.; Atlanta, Ga.; Warren, Ohio; Columbia, Pa.

GRINNELL

FOUNDED 1850

WHENEVER **PIPING** IS INVOLVED

Terrazzo in overalls

TERRAZZO, formerly considered mainly as an "artistic" flooring, is now wearing overalls—going to work for industry in washrooms, display rooms, offices, industrial lobbies and halls. Industry has found out that terrazzo has more than artistic beauty to recommend it. Floors of terrazzo wear almost forever and are inexpensive and easy to maintain. Made with Medusa White, the "original" White Portland Cement, floors are sanitary, easy to clean and look clean when they are cleaned. Also, light-colored terrazzo floors increase light reflection and save electricity.

Let "terrazzo in overalls" go to work on your job—specify it for new construction or have it laid over old gray concrete floors. Investigate the industrial uses of terrazzo. Our engineering department will be glad to work with you.

"FIFTY-FOUR YEARS OF CONCRETE PROGRESS"

MEDUSA PORTLAND CEMENT COMPANY

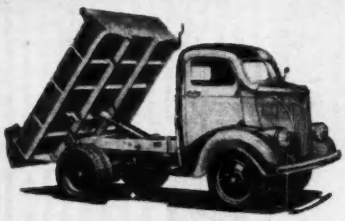
1001 Midland Building • Dept "C" • Cleveland 15, Ohio

stucco • cast stone • terrazzo • architectural slabs • white cement floors
bridges • curbings • white faced concrete blocks • concrete products

The BEST COSTS LESS

TRADE MARK

For years Gar Wood has consistently offered truck and trailer equipment of utmost utility and outstanding value. Leadership in this field resulted from this policy. Gar Wood equipment costs less in the long run because it is better built to give peak performance and lasting satisfaction.



Type C12 Body and Model D6 or D7 Hoist. Dumping angle 55°.

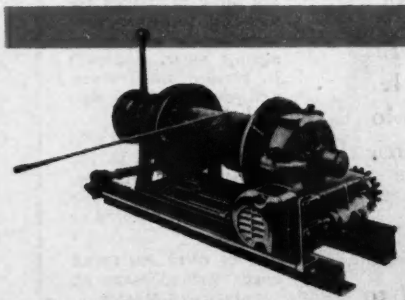
Type X-112 Extra heavy duty Body with automatic downfolding tailgate.

Special rock Body, scoop type rear end. Model F4CA cam and roller Hoist.

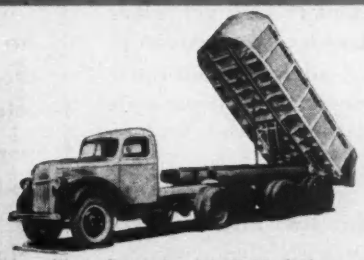
Type W12 Body. Model F4C cam and roller Hoist. Capacity 6 cu. yds.

Type X-112 Extra heavy duty Body, scoop end, with Model T-4440 Hoist. Capacity 19 cu. yds.

Type W12 Body, front recessed for Model TV83 Hoist. Capacity 15 cu. yds.



Rapid Reverse truck Winch. Single lever control. Capacities 15,000 to 60,000 pounds line pull.



West Coast Special W-12 Body, Model F8C cam and roller Hoist. Capacity 10 cu. yds.

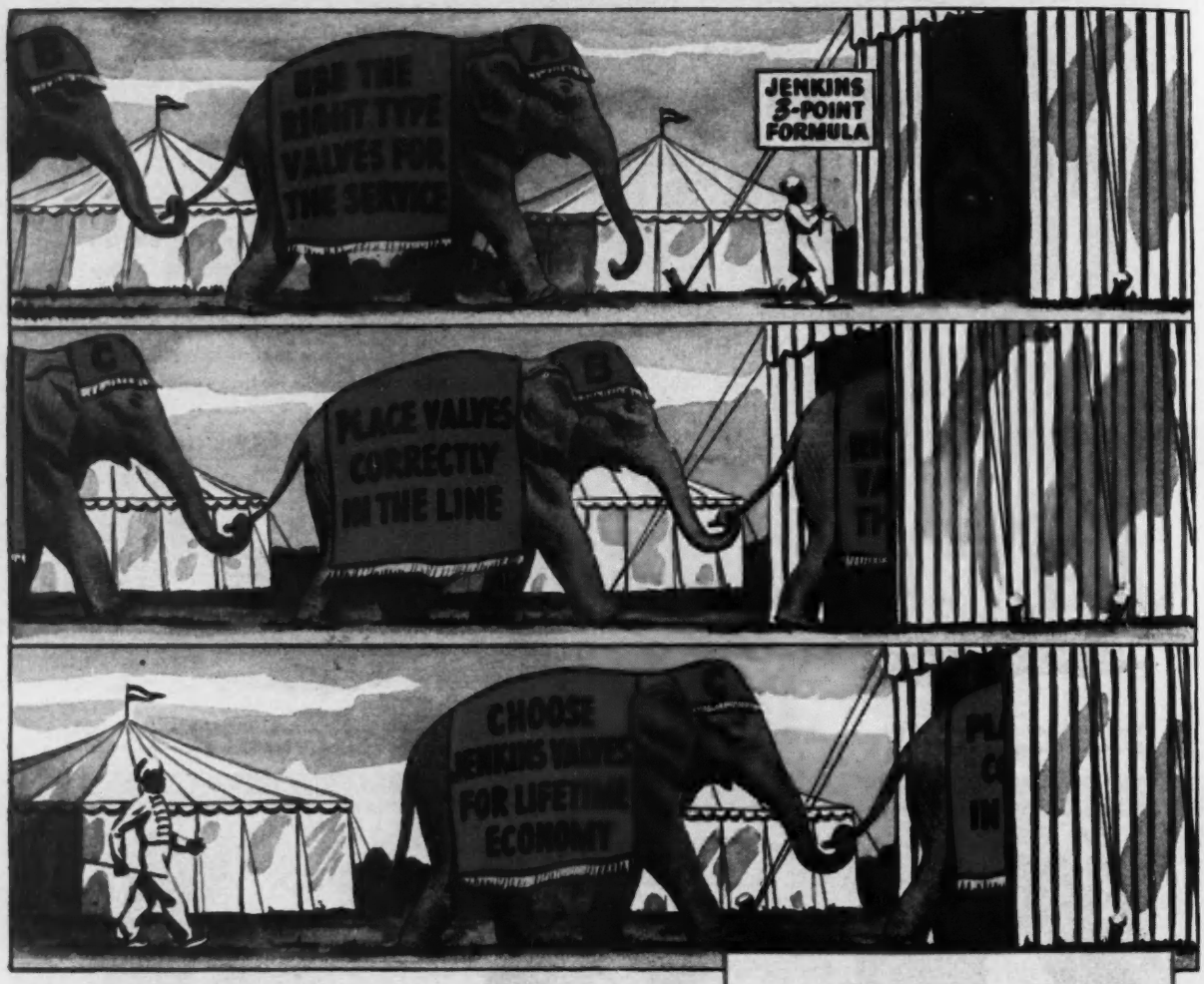
Telescopic boom Crane. Radius 8 to 20 feet.

GAR WOOD INDUSTRIES, INC.

7924 RIOPELLE ST. DETROIT 11, MICH.

WORLD'S LARGEST MANUFACTURERS OF TRUCK AND TRAILER EQUIPMENT

OTHER PRODUCTS: TRUCK TANKS ROAD MACHINERY HEATING EQUIPMENT MOTOR BOATS


USE THE RIGHT TYPE VALVES FOR THE SERVICE
JENKINS 3-POINT FORMULA
PLACE VALVES CORRECTLY IN THE LINE
CHOOSE JENKINS VALVES FOR LIFETIME ECONOMY

A Good "Lead" to Lower Valve Costs

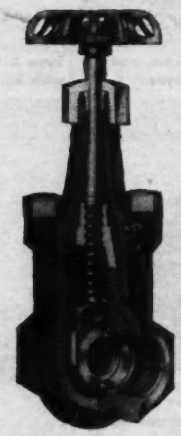
By choosing Jenkins Valves, you not only get valves made with *extra* endurance that means *extra* economy.

You also get the experienced advice of top-rated valve specialists, Jenkins Engineers, on any question of selection or placement. Write for Booklet No. 944 on installation.

Base your valve buying on the 3-Point Formula, and make sure of the *extra* value that means *lowest cost in the long run.*

Jenkins Bros., 80 White Street, New York 13; Bridgeport; Atlanta; Boston; Philadelphia; Chicago. Jenkins Bros., Ltd., Montreal; London, England.

Jenkins U-Bolt Gate Valve



Its Patented Bonnet Saver Bushing, Heavy Duty Body and Bonnet, and Easy Accessibility are three of sixteen advanced features that reduce care and guard against wear. Compare it, feature for feature, and you'll agree it's tops in its class!

Sizes ¼" to 3". Working Pressure up to 125 lbs. steam or 175 lbs. O.W.G. Bronze Mounted or All Iron – Screwed or Flanged.

ONE OF OVER 600 EXTRA VALUE VALVES MADE BY JENKINS VALVE SPECIALISTS

JENKINS VALVES

REG. U.S. PAT. OFF. TRADE JENKINS MARK Jenkins Bros

LOOK FOR THIS FAMOUS DIAMOND MARK

SINCE 1864 • THE MARK OF TRUSTWORTHY VALVES

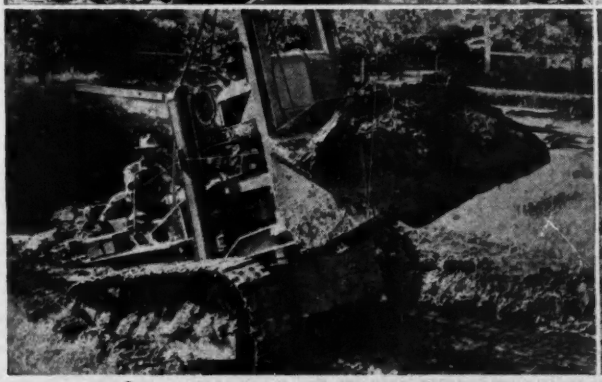
BRONZE • IRON • STEEL • CORROSION-RESISTING ALLOYS . . . 125 TO 600 LBS. PRESSURE . . . OVER 600 PATTERNS FOR EVERY INDUSTRIAL, ENGINEERING, MARINE, PLUMBING-HEATING SERVICE

When You're Traxcavating, You're PROFIT-MAKING!

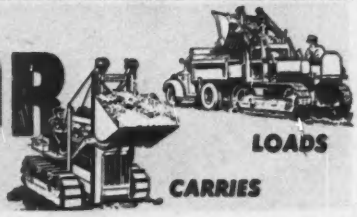
TRAXCAVATORS get things done! Put them to work digging, loading, carrying, grading and watch your hourly production climb — your operating costs fall. TRAXCAVATORS are seldom idle because these versatile, multi-purpose machines combine the usefulness of a shovel, loader, scraper, bulldozer — and with the available interchangeable attachments, they are the "workingest" machines you ever saw. More work, on more jobs, more days in the year mean low-cost, top notch performance and greater profit.

TRAXCAVATORS are built in several sizes — for every job and purpose — with bucket capacities from ½ to 2½ cubic yards. Each is a balanced unit with the rugged "Caterpillar" track-type tractor by which it is powered. Learn now why it pays you to *traxcavate*—get the facts from your TRACKSON-"Caterpillar" dealer or write direct to TRACKSON COMPANY, Dept. EN-66, Milwaukee 1, Wisconsin.

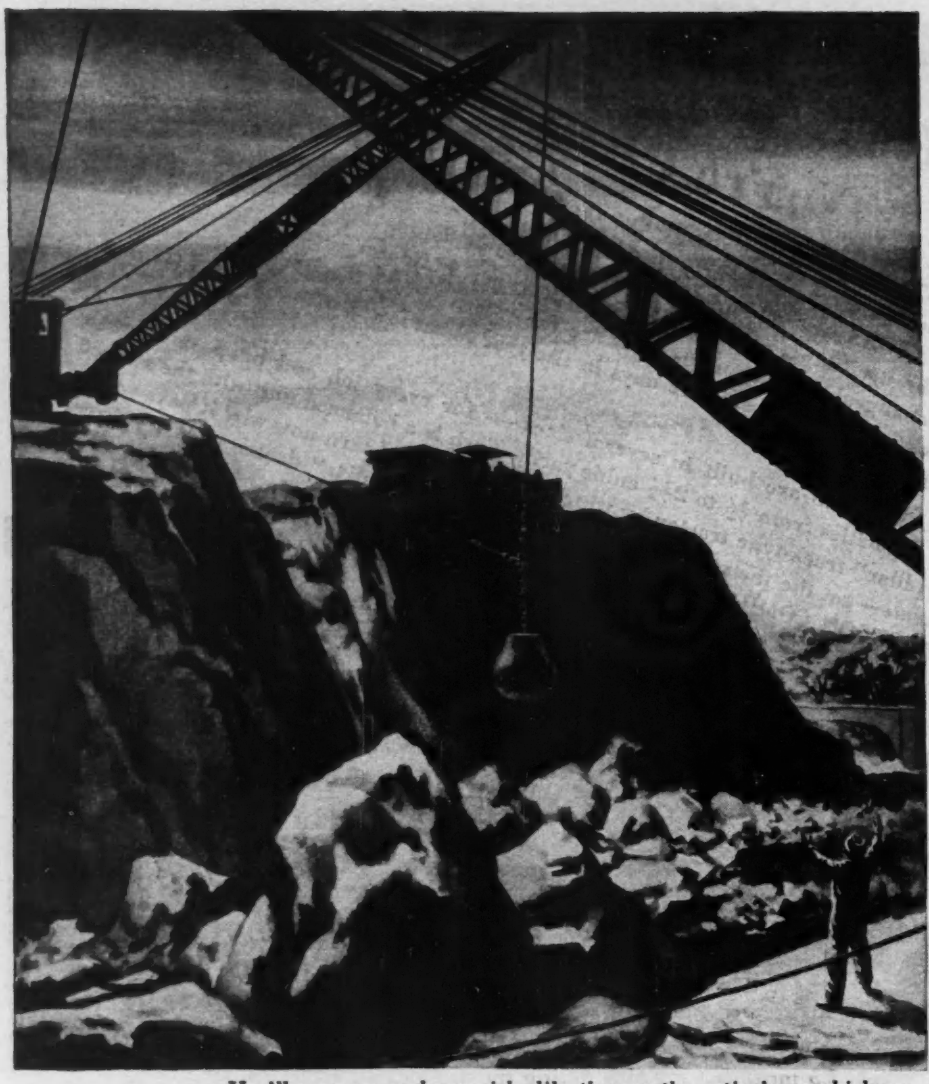
Top Views: TRAXCAVATOR on Illinois sewer job —clearing, grading and transporting concrete pipe
Lower Right: Grading and leveling around new home
Lower Left: IT4 TRAXCAVATOR digging a house basement



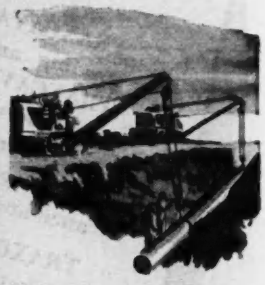
TRAXCAVATOR
REG. U. S. PAT. OFF.
THE ORIGINAL TRACTOR EXCAVATOR



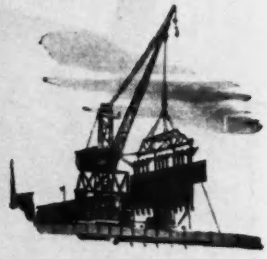
DIGS GRADES LOADS CARRIES



You'll see more and more jobs like these as the nation's new highway and airport building program gets under way. Skull-crackers and draglines use a lot of Preformed wire rope to get the material out.



Laying pipe lines is a fast job today with machines and Preformed wire rope. Improved methods and improved wire rope make the work easier and faster.



Do you worry when you see great weights lifted by shipyard cranes? The operators don't, for they know the Preformed wire rope will hold.

Here you see Post-War Progress in Action...

Wire Rope Makes it Possible

For the busy post-war days ahead, machines are rigged with Preformed wire rope. It lasts longer. It reduces time lost for replacement. It handles easier. It is safer. These operators and the front office agree Preformed is the rope for post-war progress.

ASK YOUR OWN WIRE ROPE MANUFACTURER OR DISTRIBUTOR

PREFORMED

WIRE ROPE HANDLES EASIER - LASTS LONGER

33 SERVICE STATIONS

...ASSURE PROMPT, EFFICIENT SERVICE AT ALL TIMES ON **SKILSAW**

● This nation-wide SKILSAW service organization is manned by expert personnel . . . stocks only genuine factory repair parts. It stands always ready to put your SKILSAW in like-new operating condition in the shortest possible time . . . so that your SKILSAW will be *on the job* more hours . . . making more money for you every hour. If your SKILSAW needs overhauling, contact your distributor for the address of the nearest authorized service station.

SKILSAW, INC., 5033-43 Elston Ave., Chicago 30, Ill.
Factory Branches in All Principal Cities

PORTABLE ELECTRIC

SKILTOOLS

MADE BY SKILSAW, INC.

TEN TOUGH MILES BUILT WITH ZONED

"Caterpillar" Diesel DW10 Tractor pulling LaPlant-Choate scraper. Of his DW10s, owner R. A. Heintz says: "Easy to handle — no repairs — plenty fast. They operate when other equipment is down.

Rugged power and traction enable "Caterpillar" Diesel D8 Tractors to haul loaded scrapers across the Santiam River after failure of bridges.

Contractor R. A. Heintz, of Portland, believes in "Caterpillar" Diesel Zoned Equipment, and makes it pay.

EQUIPMENT

When R. A. Heintz Construction Co. tackled the contract for ten miles of state highway between Albany and Salem, Oregon, last June, it looked like a lengthy and rugged job. Rugged was right. But the contract was finished in November, thanks to the smart handling of "Caterpillar" Diesel equipment, operated on the "Zone" system.

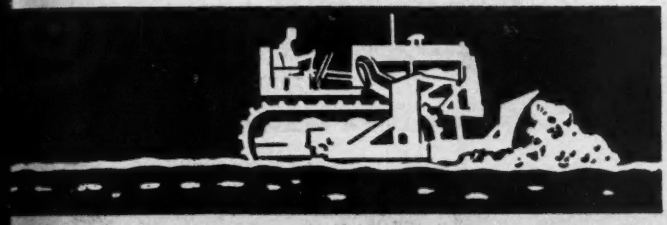
A lot of the short scraper hauls had to be made across the Santiam River. Bridges soon fell under the weight, but the husky "Caterpillar" Diesel D8 Tractors weren't stopped. They forded the stream, pulling loaded scrapers. On the longer hauls, "Caterpillar" Diesel DW10 Tractors rolled away with the loads on rubber. That's the kind of teamwork that pays off in yards per day.

"Caterpillar" Diesel equipment used on this job included 6 D8s, 1 D7, 2 D6s, 4 DW10s, 1 No. 12 Motor Grader and a D4400 Engine powering the light plant.

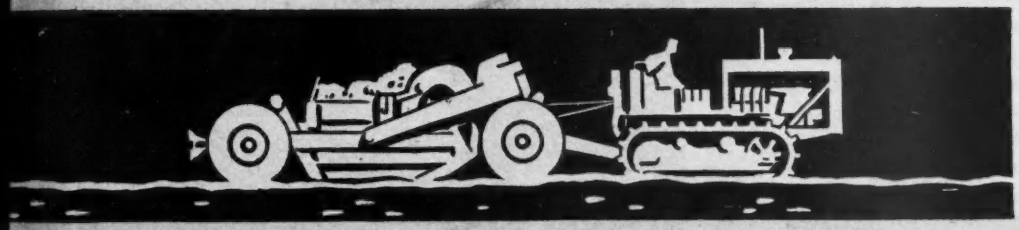
"Caterpillar" builds the units you need to zone your equipment for LOWEST COSTS ON EARTH

There are "Caterpillar" Diesel Tractors — both track-type and wheel-type — as well as the new matched "Caterpillar" Bulldozers, Scrapers and Wagons to go with them. Also Motor Graders and Engines, sized and powered for a wide range of jobs. The contractor who "goes 100% 'Caterpillar'" has many advantages including service from a single world-wide dealer organization—the most completely equipped in the industry.

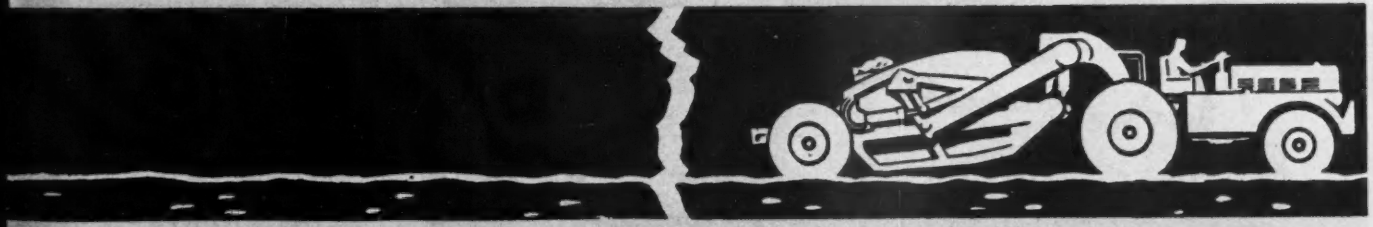
CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS



ZONE 1. *"CATERPILLAR" DIESEL TRACK-TYPE TRACTORS EQUIPPED WITH BULLDOZERS AND RIPPERS*



ZONE 2. *"CATERPILLAR" DIESEL TRACK-TYPE TRACTORS FOR LOADING AND PULLING SCRAPERS*



ZONE 3. *"CATERPILLAR" DIESEL WHEEL-TYPE TRACTORS FOR HIGH-SPEED HAULS*

CATERPILLAR DIESEL

REG. U.S. PAT. OFF.

ENGINES • TRACTORS • MOTOR GRADERS • EARTHMOVING EQUIPMENT

TEARING OFF A MOUNTAIN TOP IS A MACK-SIZE JOB!

Here's a Mack in a strip mine at the **CAREY BAXTER and KENNEDY**, Tamaqua, anthracite operation, central Pennsylvania. Removing overburden to get down to the coal is like gouging off mountain tops. Trucks often operate hub-deep in mud. It's a job that calls for Macks. In fact, Mack trucks outnumber all others in this area. Your Mack representative knows the trucking angles of mining operations. Give him a call.

Mack Trucks, Inc., Empire State Building, New York 1, New York. Factories at Allentown, Pa.; Plainfield, N. J.; New Brunswick, N. J.; Long Island City, N. Y. Factory branches and dealers in all principal cities for service and parts.

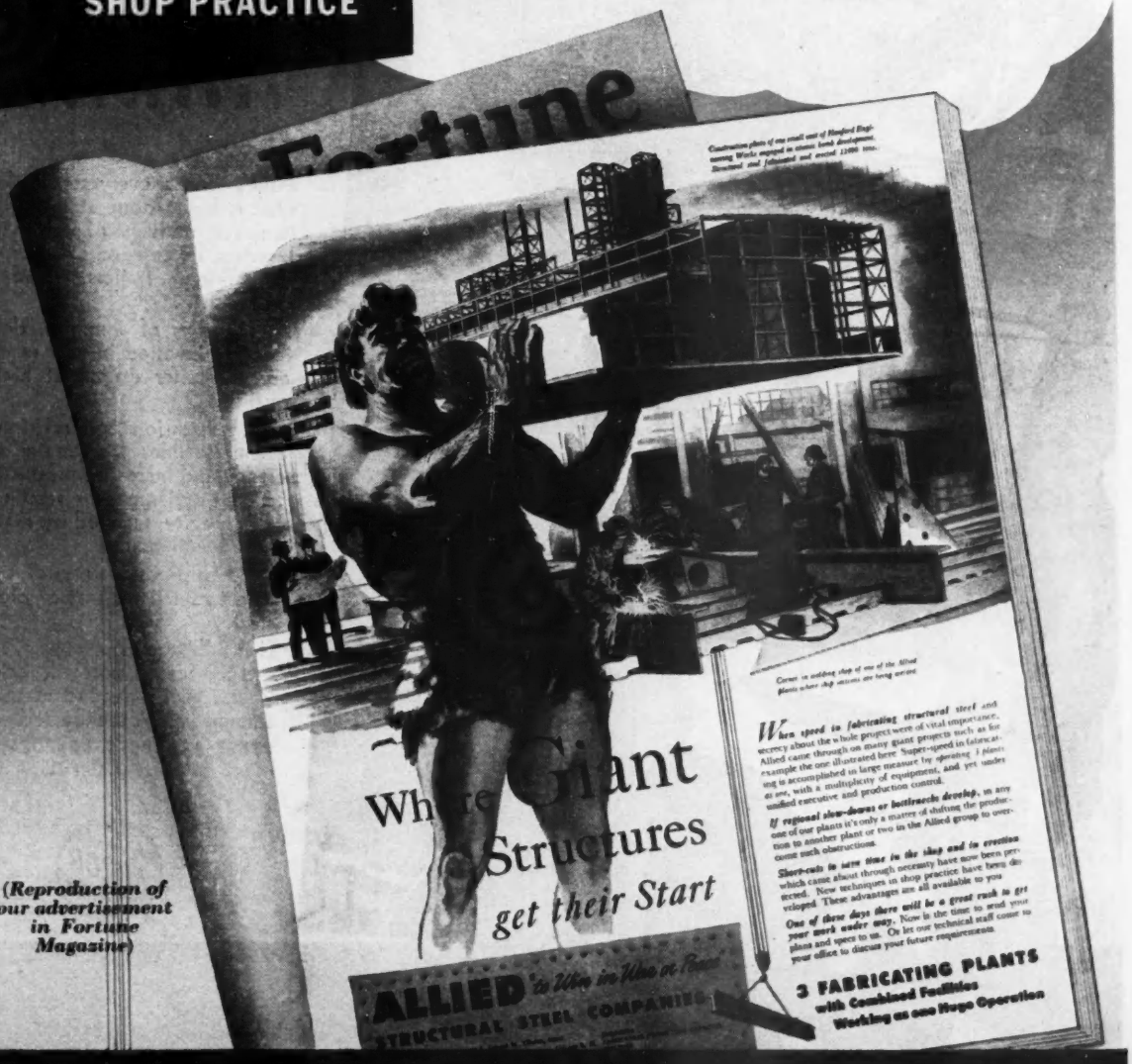
Mack
TRUCKS
FOR EVERY PURPOSE

PERFORMANCE COUNTS!

Precise Engineering

BACKED UP WITH THE LATEST IN SHOP PRACTICE

When you decide to have Allied fabricate your structural steel, your plans are translated into shop layouts which result in speeding your job through the shop and in accuracy which saves time when the material arrives on the site for erection. Send your plans and specs to us for estimate. NOTE: If you have a fabricating job other than for buildings, ships, and bridges, consult us. We have facilities for contract work in steel or aluminum, riveted or welded.

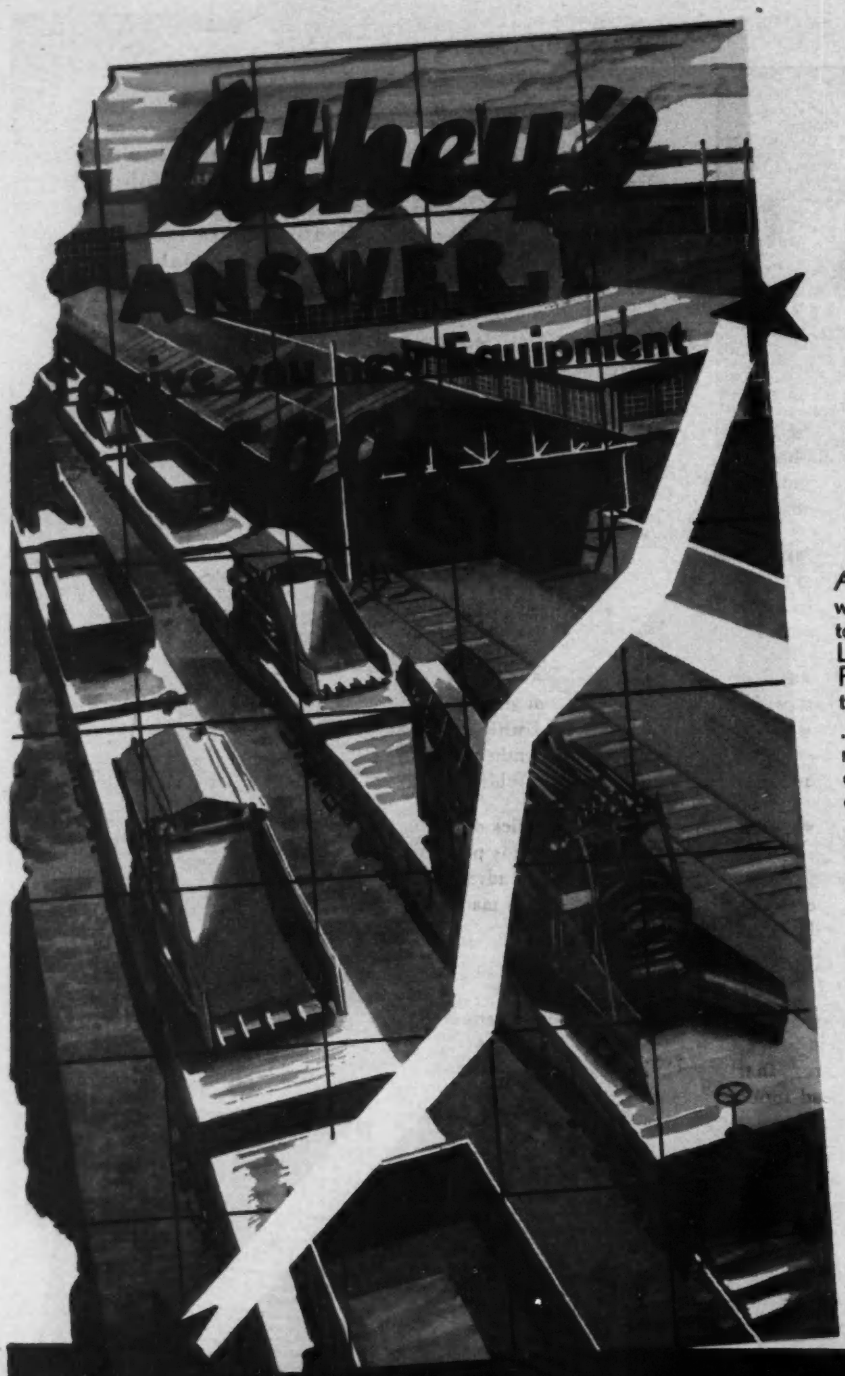


(Reproduction of our advertisement in Fortune Magazine)

ALLIED STRUCTURAL STEEL COMPANIES

CLINTON BRIDGE WORKS, 101 S. Second St., Clinton, Iowa
GAGE STRUCTURAL STEEL CO., 3123-41 S. Hoyne Ave., Chicago 8, Ill.
MIDLAND STRUCTURAL STEEL CO., 1300-20 S. 54th Ave., Cicero 50, Ill.

ENGINEERS
FABRICATORS (75,000 TONS CAPACITY)
ERECTORS



378% INCREASE IN PRODUCTION OF *Athey* PRODUCTS...

Athey wants everyone to know what is being done at the factory to speed delivery of new Mobi-Loaders, Force-Feed Loaders, and Forged-Trak Trailers. Here are the facts . . .

. . . quarter of a million dollars recently invested in new machinery for faster output at highest quality.

. . . expansion and revision of assembly lines for greater efficiency and increased production.

. . . all departments operating at full capacity, manned by highest skilled workmen.

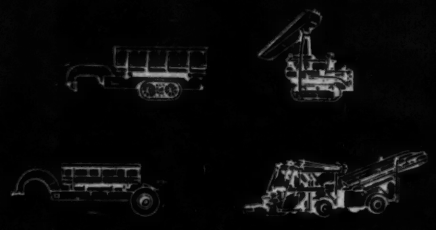
. . . a production rate today almost four times that of prewar level.

That's "Athey's Answer" . . . and the reason you will receive your urgently-needed machines sooner than you expected!

ATHEY PRODUCTS CORPORATION
Chicago 38, Illinois

Athey APCOR Products

Athey



DEPENDABLE HAULING AND LOADING EQUIPMENT

Name the DRYING SPEED... *Red Lead can meet it*

Through the years, Red Lead's effectiveness in fighting rust has won it general acceptance by industry as the standard for metal protection.

Perhaps less generally known, however, is that Red Lead's *extra* protection is available in an extensive range of paint formulations to give you the drying speed you need.

This wide choice is due to Red Lead's compatibility with the many types of paint vehicles in use today. It can be combined with the new synthetic resins, modified synthetics, natural resins, drying oils and other vehicles.

So, whether painting schedules demand quick drying, or whether normal drying time is permitted, remember, you can take full advantage of the plus protection that has made Red Lead famous.

Why RED LEAD Means Extra Rust Protection

Red Lead has the property of counteracting acid conditions, recognized as accelerators of rust. In the presence of various acids, Red Lead forms insoluble lead salts at the approximate rate at which the acids are supplied.

This is true whether the acid originates from acid-forming environments, such as gas, smoke and moisture in the atmosphere, or from the decomposition of the vehicle. Thus, a rust-inhibiting condition is maintained with a Red Lead paint.

Red Lead also forms an adherent protective shield which prevents electro-chemical action, another prime cause of rusting.

Specify RED LEAD for All Metal Protective Paints

The value of Red Lead as a rust preventive is most fully realized in a metal paint where it is the only pigment used. However, its rust-resistant properties are so pronounced that it also improves any multiple pigment paint.

No matter what price you pay, you'll get a better paint for surface protection of metal, if it contains Red Lead.

Write for New Booklet—*"Red Lead in Corrosion Resistant Paints"* is an up-to-date, authoritative guide for those responsible for specifying and formulating paint for structural iron and steel. It describes in detail the scientific reasons why Red Lead gives superior protection. It also includes typical specification formulas—ranging from Red Lead-Linseed Oil paints to Red Lead-Mixed Pigment-Varnish types. If you haven't received your copy, address nearest branch listed below.

NATIONAL LEAD COMPANY: New York 6; Buffalo 3; Chicago 80; Cincinnati 3; Cleveland 13; St. Louis 1; San Francisco 10; Boston 6, (National Lead Co. of Mass.); Philadelphia 7, (John T. Lewis & Bros. Co.); Pittsburgh 30, (National Lead Co. of Pa.); Charleston 25, W. Va., (Evans Lead Division.)

Dutch Boy
Reg. U.S. Pat. Off.
Red Lead

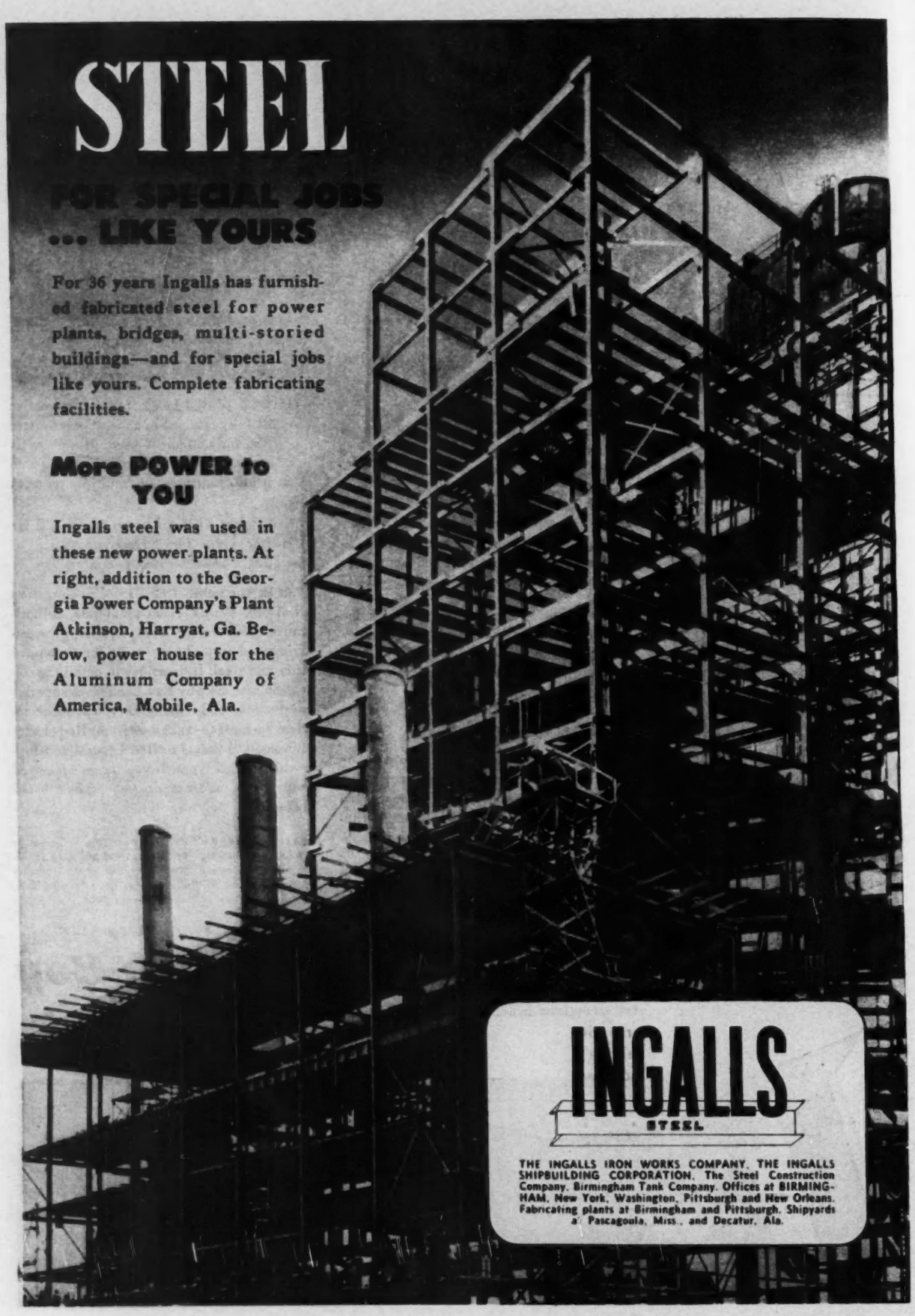
STEEL

FOR SPECIAL JOBS ... LIKE YOURS

For 36 years Ingalls has furnished fabricated steel for power plants, bridges, multi-storied buildings—and for special jobs like yours. Complete fabricating facilities.

More POWER to YOU

Ingalls steel was used in these new power plants. At right, addition to the Georgia Power Company's Plant Atkinson, Harryat, Ga. Below, power house for the Aluminum Company of America, Mobile, Ala.



INGALLS
STEEL

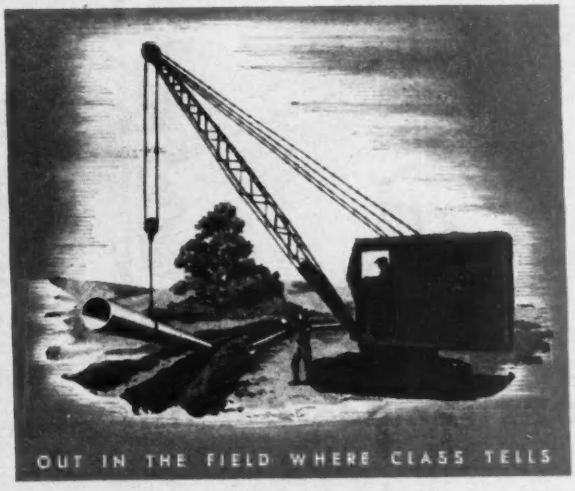
THE INGALLS IRON WORKS COMPANY, THE INGALLS SHIPBUILDING CORPORATION, The Steel Construction Company, Birmingham Tank Company. Offices at BIRMINGHAM, New York, Washington, Pittsburgh and New Orleans. Fabricating plants at Birmingham and Pittsburgh. Shipyards at Pascagoula, Miss., and Decatur, Ala.

Sturdiness And Stamina In Chrysler Industrial Engines

RECORD* . . . With built-in precision and advanced engineering, Chrysler engines have demonstrated a sturdiness and stamina that meet the challenge of day-in, day-out gruelling use.

Chrysler designers and engineers introduced the compact, high compression engine—adapted it to various types of industrial uses — constantly improved it wherever possible.

Superfinishing of moving parts—originated by and exclusive with Chrysler—makes them practically



wear-proof—increases efficiency of the engine and insures long life.

The most modern and efficient manufacturing equipment is employed to attain built-in precision. Rigid inspection proves the quality of materials and accuracy of processing before final release for various industrial power applications.

Thus—sturdiness and stamina are in-built characteristics of Chrysler Industrial Engines, assuring users safe, dependable, efficient and economical power.

*One of the 8 *character points* in the Chrysler Industrial Engine Pedigree

Meet The Challenge of Gruelling Use

To meet the power demands of modern industry in various fields of application an industrial engine must be more than just a good engine.

It must have a reserve of power and stamina for the strenuous jobs and added hours of continuous operation. It must keep going under unfavorable conditions —out in the field where exposed to the elements.

Chrysler Industrial Engines are "Horsepower With a Pedigree." They possess inherent qualities that enable them to meet the challenge of gruelling use. They are more than engines—they are units of "packaged" horsepower that can be depended on when the going is tough.

That's why they have been so successful in meeting the varied power requirements of tractors, shovels, cranes, pumps, air compressors, generator sets and other power applications in the construction industry.

Attention Dealers: Some desirable Chrysler Industrial Engine territories are available. Write to the Chrysler Industrial Engine Division for complete information.

CHRYSLER
INDUSTRIAL ENGINES
Horsepower with a Pedigree

Industrial Engine Division, Chrysler Corp.
12200 East Jefferson, Detroit 31, Michigan

Please send the Chrysler Industrial Engine Catalog.

Name_____

Address_____

6 City_____ State_____

WOOLDRIDGE
EARTHMOVING EQUIPMENT
Includes

★ **SCRAPERS**
Tractor-drawn for handling heaping yardages from 6 to 28 cu. yards.

★ **POWER CONTROL UNITS**
Single and multiple drum with universal or roller fairleads.

★ **BULLDOZERS**
Tough and rugged design for standard makes of tractors.

★ **TRAILBUILDERS**
Adjustable angle-blades for standard tractor mounting.

★ **RIPPERS**
Available in light, medium and heavy duty models with two sizes to each model.

DISTRIBUTOR SALES & SERVICE FACILITIES IN ALL PRINCIPAL AREAS & FOREIGN TERRITORIES

Due to their exclusive, hydraulic steering system Wooldridge Terra-Cobras always maintain a fixed direction of travel over all types of ground including soft or slippery surfaces. Obstacles such as rocks, ruts or timbers in their path will not cause these high speed earthmovers to veer from their set course. A single steering bar permits operator to maintain positive *two-wheel* steering control from a fraction of a degree to a sharp angle turn. With no effort required, operators are able to maintain higher yardage averages throughout an entire shift. To keep yardages on the move investigate Wooldridge Terra-Cobras for your jobs—today!

WOOLDRIDGE
MANUFACTURING COMPANY
SUNNYVALE · CALIFORNIA · U. S. A.

Hi-Speed Self-Propelled
EARTHMOVERS

ALL-STEEL LOW-COST VEHICLE SHELTER

Featuring flexibility of construction and adaptability to many industrial uses, the Stran-Steel "Quonset 24" provides an answer to the steadily increasing demand for a low-cost, permanent vehicle shelter.

The "Quonset 24" (24 feet wide by any length desired, in sections of 12 feet) is framed with Stran-Steel *nailable* framing members, permitting the simple attachment of exterior steel sheathing and interior collateral materials. The Stran-Steel system also makes possible the quick and economical addition of extra 12-foot sections, or the demounting of the entire structure for re-erection elsewhere. Openings 12 feet wide by 8 feet high permit the entry of average-size trucks and cars. All-steel materials insure fire-safety and freedom from weather and rodent deterioration.

Among other uses, the "Quonset 24" is a "natural" for housing company officials' and guests' cars. With one section equipped for repair work, cars and trucks can be serviced while garaged. The remaining sections can be had with open front or with 12-foot sliding doors.

There are probably several uses for one or more of these buildings around your plant. Write today for additional details and prices.

GREAT LAKES STEEL CORPORATION

STRAN-STEEL DIVISION • PENOBSCOT BUILDING • DETROIT 26, MICHIGAN

UNIT OF NATIONAL STEEL CORPORATION

STRAN-STEEL "QUONSET 40"

40 feet wide by any length, in sections of 20 feet. Economical, all-steel, arch-rib construction. Fire-safe; rot-, sag- and warp-proof. Adaptable to many industrial uses.

STRAN-STEEL "QUONSET 20"

20 feet wide by any length, in sections of 12 feet. With the exception of doors and windows, construction features are similar to those of the "Quonset 40."

Gulf Products selected by Contractor on Mississippi's largest levee project

Gulf Quality Lubricants and Fuels help Atlas Construction Company get maximum job efficiency under tough operating conditions

Moving a total of 10,350,000 yards of earth—under difficult operating conditions and against a rigid time schedule—is no small undertaking. It is the kind of job on which the contractor is not likely to take chances with his equipment. He wants proper lubrication and efficient fuels to insure top performance and prevent costly delays caused by breakdowns.

That is why Atlas selected Gulf quality lubricants and fuels for their two Mississippi Levee projects, which they completed well ahead of schedule. Both were a grueling test for men and equipment. On one of the jobs, at Bougere, upwards of 8,500,000 yards were moved—the largest single levee project ever undertaken on the Mississippi River.

The Atlas Construction Company, and many other leading contractors, have formed the habit of using Gulf quality lubricants and fuels as basic profit insurance. They know that Gulf products help speed up the job—keep operating costs at rock-bottom levels.

Call in a Gulf Service Engineer before you start your next job—he will help you complete it more quickly and at a larger profit. Write, wire, or phone your nearest Gulf office today.

GULF

Gulf Oil Corporation · Gulf Refining Company

Division Sales Offices:

Boston · New York · Philadelphia · Pittsburgh · Atlanta
New Orleans · Houston · Louisville · Toledo

Among Buckets, Haiss Hi-Power excels through a time-tested combination of many superior features.

Weight distribution, for instance, is so concentrated that the bucket jaws carry downward to bury the entire bowl to insure the biggest possible payload.

Similarly, when the Haiss Hi-Power tackles a stuck-fast boulder it "grabs tight" to shake and tug until it's loose and "hoist away".

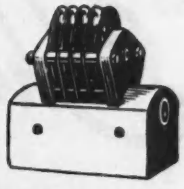
Investigate now the greater efficiency that comes naturally with buckets engineered by Haiss. Catalogs on request.

GEORGE HAISS MFG. CO., INC., 140th Street & Rider Avenue, New York 51, N.Y.

Distributors in all large cities

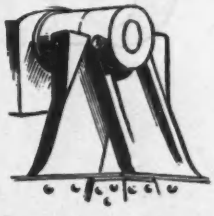
HIGHEST CLOSING RATIO (up to 7:1)

Can be reeved 3, 4, 5, 6 or 7:1 for speed or power as required. Exclusive 4-Position Wedge-Lock dead ending keeps reeving always parallel and 100% centered in sheave grooves.



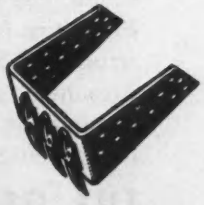
LOWER SHEAVES HIGH ABOVE COUNTERWEIGHT

Up, out of the muck. Non-pocketed. No place for dirt to jam, to cause friction or undue rope wear. Bolt holes in block provide for added counterweight.



CAST STEEL BLADE ARMS FOR STIFFNESS

Rib-reinforced. Rigid strength and extra long bearings (renewably bushed) keep bowl closing true. Full efficiency; bigger payloads.



HEAVIEST JAWS OF ANY BUCKET OF ITS KIND

Abrasion resistant alloy. Will stand heavy battering and still hold shape. Chisel-point or pick-point teeth of similar extra strength.

HAISS

PORTABLE CONVEYORS ★ LOADERS ★ CLAMSHELL BUCKETS

NEW TIRE CONSTRUCTION ABSORBS SERVICE DAMAGE —REDUCES OPERATING COSTS

the *Shock-Absorber Constructed*

GENERAL DEEP CLEAT

GENERAL ROCK SPECIAL

● General Off-the-Road Tires take "in stride" the service abuses that commonly cause tire failures. Their exclusive construction *absorbs* and uniformly distributes heaviest shock loads and stresses throughout the tire carcass . . . thereby neutralizing concentrations of impact that frequently cause bruising . . . tearing . . . snagging . . . blow-outs.

Built with General's famous Top Quality, the exclusive shock-absorbing design of General Off-the-Road Tires produces a new standard of long tire service and economy for heavy contractors.

THE GENERAL TIRE & RUBBER CO. • AKRON, OHIO

The GENERAL TIRE — OFF-THE-ROAD TIRES

FOUNDATIONS

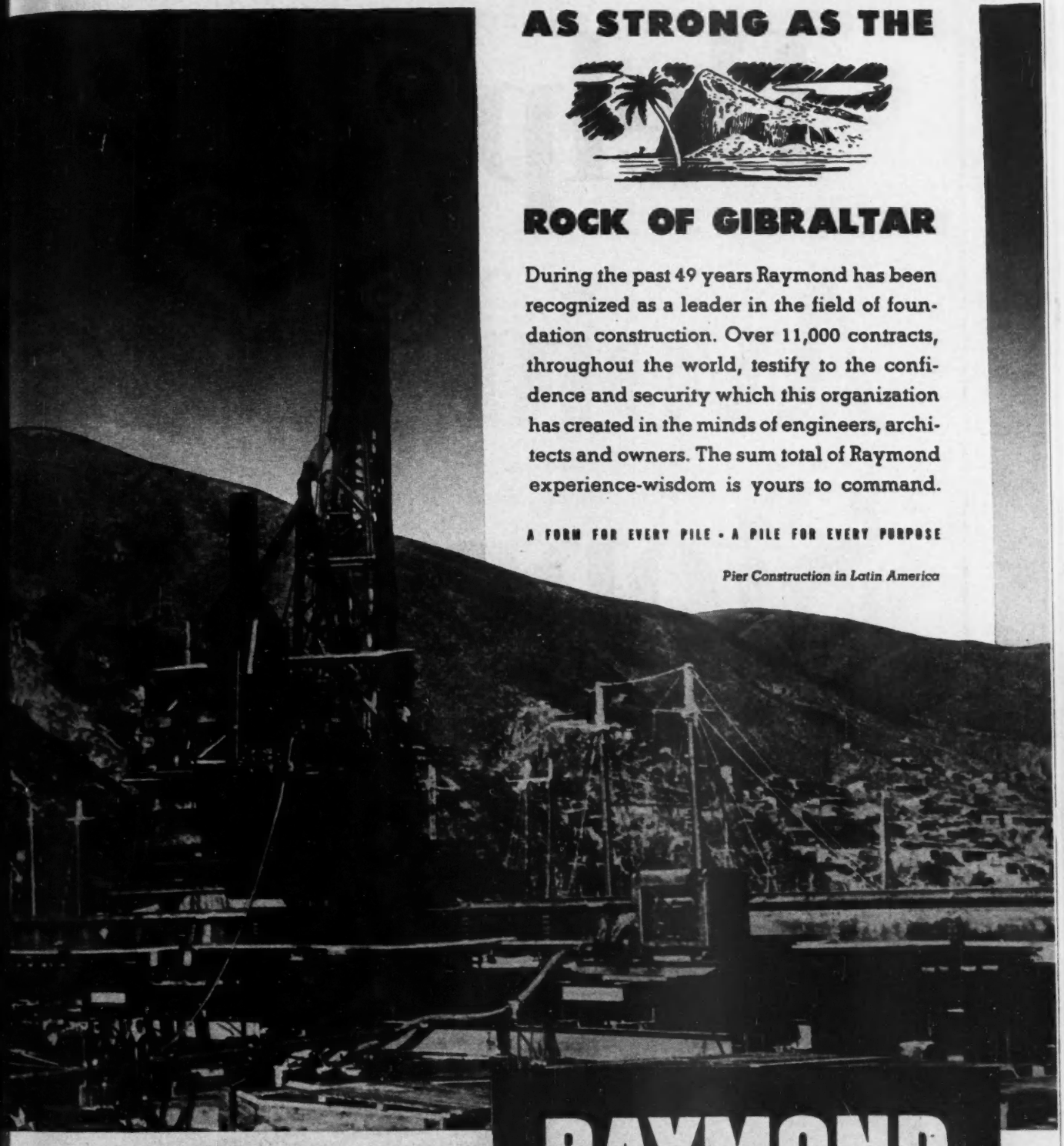
AS STRONG AS THE

ROCK OF GIBRALTAR

During the past 49 years Raymond has been recognized as a leader in the field of foundation construction. Over 11,000 contracts, throughout the world, testify to the confidence and security which this organization has created in the minds of engineers, architects and owners. The sum total of Raymond experience-wisdom is yours to command.

A FORM FOR EVERY PILE • A PILE FOR EVERY PURPOSE

Pier Construction in Latin America



INQUIRIES INVITED ON SMALL AND LARGE JOBS

THE SCOPE OF RAYMOND'S ACTIVITIES includes every recognized type of pile foundation – concrete, composite, precast, steel, pipe and wood. Also caissons, construction involving shore protection, ship building facilities, harbor and river improvements and borings for soil investigation.

RAYMOND
CONCRETE PILE CO.

Helps You Avoid Work Stoppages!

SOCONY-VACUUM OIL COMPANY, INC., and Affiliates: Magnolia Petroleum Company, General Petroleum Corporation

Here's Complete Lubrication Service — specifically designed to help you meet and beat contract dates!

Question: **Having too many *unscheduled* work slow-downs and stoppages — due to equipment failures?**

Answer: We can help you minimize "down-time" — keep hard-pushed machines operating full-tilt, full-time — by supplying you with exactly the right oil or grease for every application.

Question: **Does machine refueling and lubrication eat up too much valuable time in the field?**

Answer: We arrange on-the-job deliveries *wherever* you locate. This means fewer field interruptions, fewer inventory problems — minimum bother with rush orders, follow-ups.

Question: **Having trouble finding a maintenance plan that fits your *individual* requirements?**

Answer: Our representative supplies you with tested maintenance schedules quickly and easily adaptable to *your* operating methods — *your* type of equipment — *your* maintenance set-up!

Question: **Are "problem" machines tying up other equipment . . . slowing vital operations?**

Answer: Your Socony-Vacuum Representative is trained to analyze and solve equipment problems. When necessary, he can also draw on our vast engineering staff for expert counsel. Call in this man today.

Why Be Satisfied Merely With "Gas and Oil" When You Can Get Complete Service!

SAVE

MANPOWER AND HORSEPOWER

Use ALCOA ALUMINUM *Building Tools . . .*

Shovels, wheelbarrows, hods, hoist elevators, scoops, draglines—these building tools can well be made of Alcoa Aluminum. The lighter weight of aluminum hand tools saves the productive energy of manpower, speeds construction, while on big equipment you lighten power loads, save wear and tear—do a more efficient and economical job all around. Alcoa Aluminum for building materials in the form of structural shapes, sheets, castings, is also solving many difficult construction problems where resistance to corrosion, durability and high strength are important factors. Our engineers will gladly discuss these problems with you. Call your nearby Alcoa sales office or write ALUMINUM COMPANY OF AMERICA, 2108 Gulf Building, Pittsburgh 19, Pennsylvania.

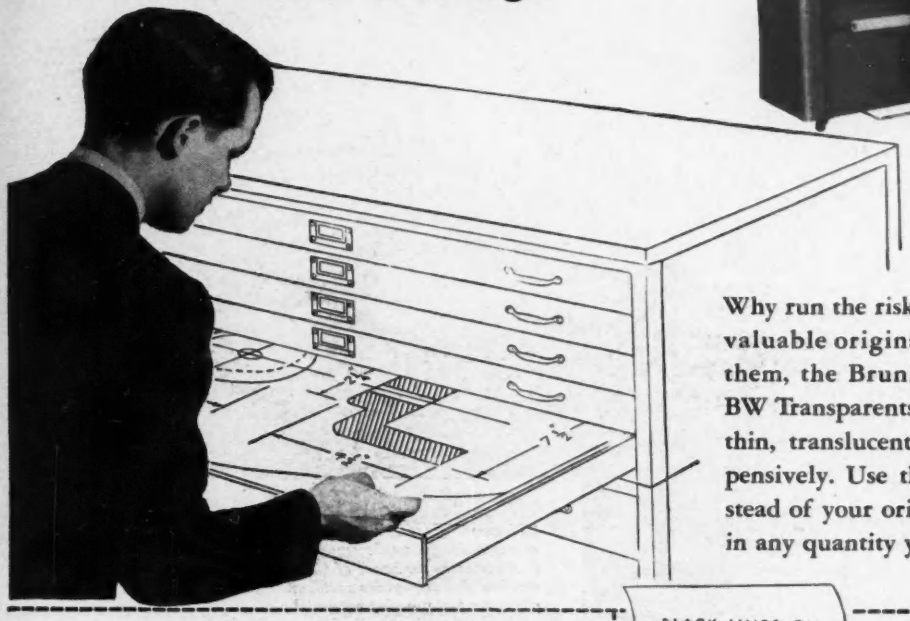
ALCOA ALUMINUM

ALCOA ALUMINUM

So Easy...So Inexpensive...

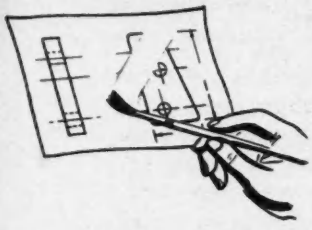
TO SAFEGUARD

Your Valuable Tracings



Why run the risk of loss or damage to your valuable original tracings? To safeguard them, the Bruning BW System provides BW Transparents—exact duplicates made on thin, translucent paper, quickly and inexpensively. Use these BW Transparents, instead of your originals, to make BW Prints in any quantity you desire!

Changes quickly made without altering originals!



BW Transparents are mighty useful, too, when you want to make minor changes on a series of prints without altering the original tracing. Such changes can be made with ink or pencil on the BW Transparent, and the following BW Prints will bear these changes. To eliminate detail on the BW Transparent, use BW Eradicator. Another BW Eradicator is available for transforming the black lines to red lines on BW Prints to denote drawing changes.

BLACK LINES ON WHITE . . . BROWN LINES ON WHITE . . RED LINES ON WHITE . . . BLACK, RED OR BROWN ON GREEN BACKGROUND...CARD WEIGHT AND THIN WEIGHT...BW FILM... BW TRANSPARENTS.

One operator can make all these BW Prints in seconds!

A compact, good-looking BW Printer and Developer takes but little space in your drafting room or office—no plumbing, no exhaust fumes. Yet, with this machine, one operator can make a wide variety of different BW Prints—in seconds! Prints are delivered ready for use—no waiting. And remember, BW printing and developing equipment is available for every need, whether you make only a few prints a day or thousands. For full information, mail the coupon.

You Get These Six Major Advantages with the BRUNING BW SYSTEM

1. A versatile, simple method for making black line or colored line prints directly from tracings.
2. 17 years' experience in analyzing printmaking needs.
3. A complete line of materials, including white and green tinted papers, thin, medium and card-weight papers, black, red or brown line prints, BW Transparents to supplement original tracings and BW Film for intensifying pencil lines in reproduction.
4. A complete line of printing and developing machines to fit every requirement.
5. A continuing service . . . because Bruning sells everything for the engineer and draftsman, not just BW equipment. Buying a BW machine is, therefore, not a "one time sale."
6. Continuing research and development in the customer's interest.

CHARLES BRUNING COMPANY, INC.

Since 1897

NEW YORK	CHICAGO		LOS ANGELES
Atlanta	Boston	Detroit	Houston
Kansas City	Milwaukee	Newark	Pittsburgh
St. Louis	San Francisco	Seattle	

CHARLES BRUNING COMPANY, INC.
4714-26 Montrose Avenue, Chicago 41, Illinois

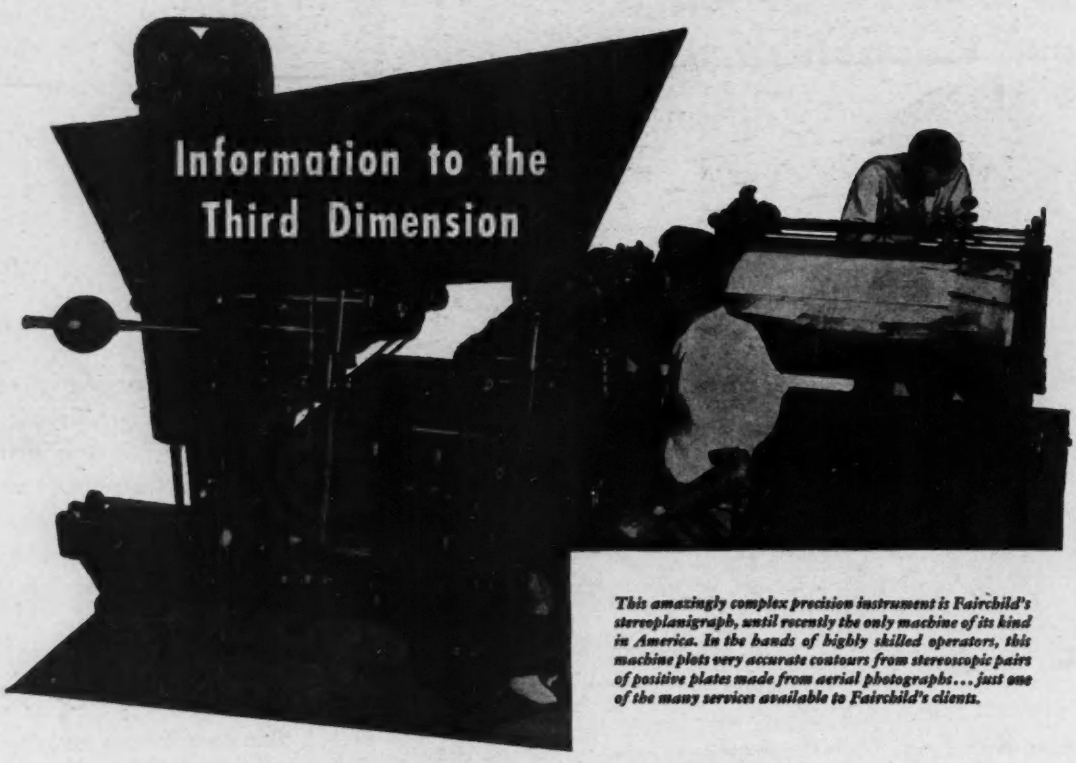
Gentlemen: I want to know more about Bruning BW Prints and equipment. Please send me information.

Name .....

Company .....

Street .....

City ..... *State* .....



This amazingly complex precision instrument is Fairchild's stereoplanigraph, until recently the only machine of its kind in America. In the hands of highly skilled operators, this machine plots very accurate contours from stereoscopic pairs of positive plates made from aerial photographs... just one of the many services available to Fairchild's clients.

for better management and engineering

The Fairchild Aerial Survey photograph gives depth as well as length and breadth to the area under the camera's lens. So minutely detailed are these pictures that trees stand up to be counted—species may be identified. Contours are plotted with the greatest of accuracy in a fraction of the time needed by ground survey methods.

Fairchild brings to the field of aerial surveying the zeal of pioneering and the ability gained by long experience. For Fairchild was the first organization of photogrammetric engineers and developed many of the methods and much of the equipment now used in the science.

Fairchild owes its general acceptance throughout the world to its pioneering work, done as long as twenty-five years ago, and to its constant leadership in new developments. If you are interested in aerial surveys for any purpose, write for information.

For Industry, Commerce and Public Works

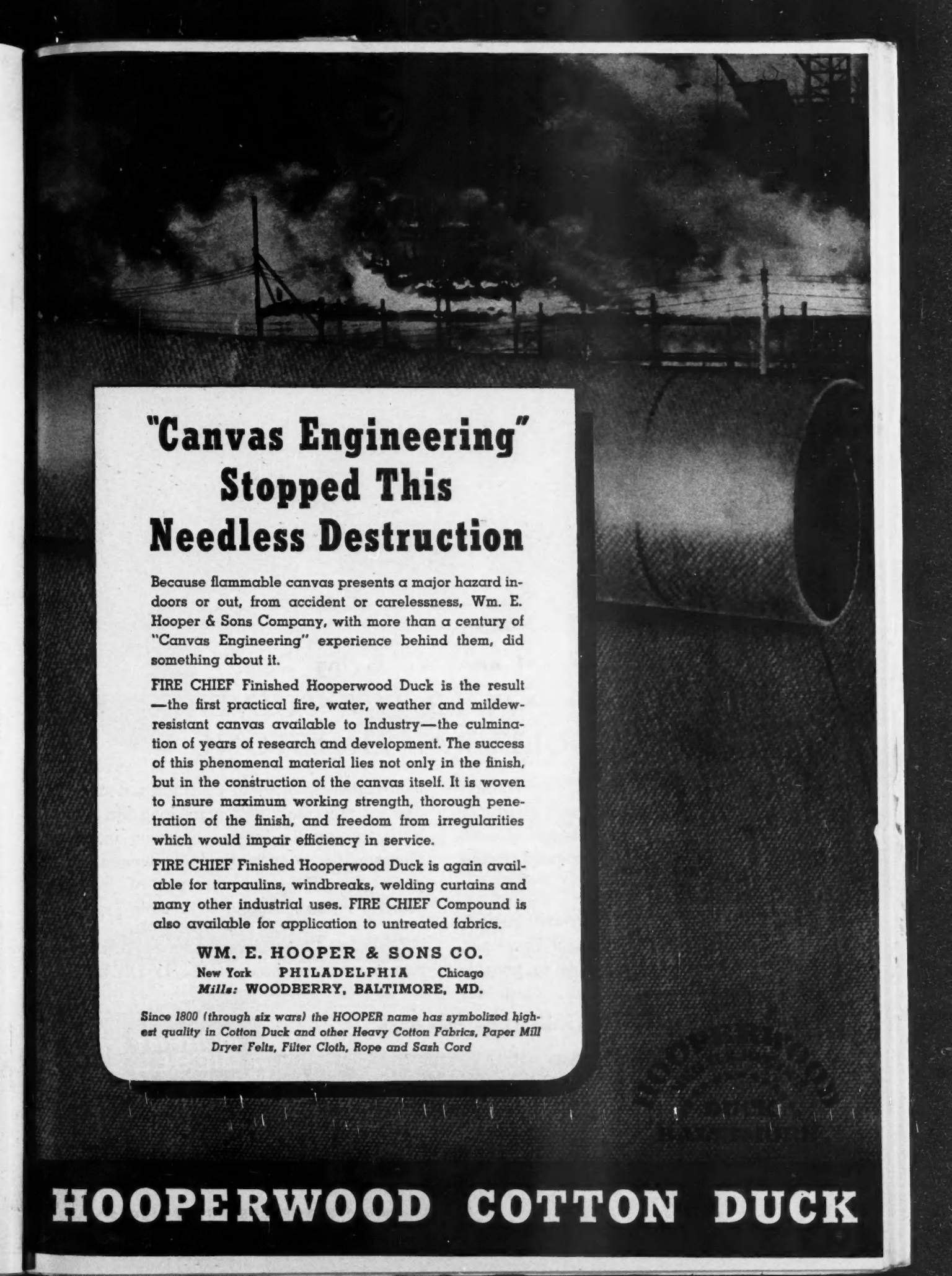
Since 1920, Fairchild has served clients all over the world, with domestic and expeditionary aerial surveys in the fields of:

Petroleum	Highways	Taxation
Mining	Railroads	Harbors
Geology	Traffic	Flood Control
Forestry	Utilities	City Planning
Water Ways	Pipe Lines	Legal Evidence

Fairchild AERIAL SURVEYS, INC.

Photogrammetric Engineers

224 EAST ELEVENTH STREET, LOS ANGELES 15, CALIFORNIA • 21-21 FORTY-FIRST AVENUE, LONG ISLAND CITY 1, N.Y.



"Canvas Engineering" Stopped This Needless Destruction

Because flammable canvas presents a major hazard indoors or out, from accident or carelessness, Wm. E. Hooper & Sons Company, with more than a century of "Canvas Engineering" experience behind them, did something about it.

FIRE CHIEF Finished Hooperwood Duck is the result —the first practical fire, water, weather and mildew-resistant canvas available to Industry—the culmination of years of research and development. The success of this phenomenal material lies not only in the finish, but in the construction of the canvas itself. It is woven to insure maximum working strength, thorough penetration of the finish, and freedom from irregularities which would impair efficiency in service.

FIRE CHIEF Finished Hooperwood Duck is again available for tarpaulins, windbreaks, welding curtains and many other industrial uses. FIRE CHIEF Compound is also available for application to untreated fabrics.

WM. E. HOOPER & SONS CO.

New York **PHILADELPHIA** Chicago

Mills: **WOODBERRY, BALTIMORE, MD.**

Since 1800 (through six wars) the HOOPER name has symbolized highest quality in Cotton Duck and other Heavy Cotton Fabrics, Paper Mill Dryer Felts, Filter Cloth, Rope and Sash Cord

HOOPERWOOD COTTON DUCK

Agricultural Limestone Plant of L. W. Hayes, at Junction City, Kansas, powered by a MURPHY DIESEL ME-6, 5¾" x 6½", 6-cylinder, 135 HP continuous, 160 HP intermittent.

DEPENDABLE POWER FOR PULVERIZING AGRICULTURAL LIMESTONE

MURPHY DIESEL is the rock crusher's answer for power that helps boost total output above average. These rugged, dependable engines have *proved this* to many portable and stationary plant operators.

MURPHY DIESELS are heavy-duty engines, very compact and relatively light in weight, making them ideally adaptable to portable equipment. Economy in operation and maintenance, ruggedness that means long life, simplicity of installation and operation in any climate, and smooth, flexible, dependable power for crushing, assure you of "more power . . . more output . . . more profit."

When buying new equipment or re-powering present machines, specify MURPHY DIESELS.

FIELD-PROVEN *Power*..

121

MURPHY DIESEL COMPANY

Engines from 90 to 165 H.P. Generator Sets from 60 to 115 K.W.

5311 W. BURNHAM STREET • • • • • MILWAUKEE 14, WISCONSIN

LIKE A CHAMPION MARKSMAN..

FORM-SET ROPE IS *Relaxed*

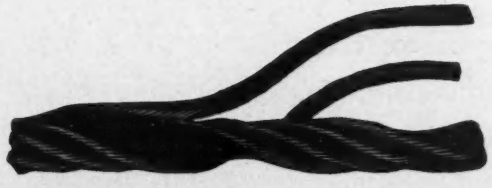
The sharpshooting rifleman can't afford tension. Watch him as he sights on the bull's-eye. Keen, alert, a study in concentration, he's nevertheless relaxed. The slightest twitch or jerk as the trigger is squeezed would throw him off line.

Much of that same relaxed effect is present in Form-Set rope—Bethlehem's preformed. Wires and strands have been helically shaped in advance, before being laid in the rope. They retain this helical shape; they have no urge to uncoil. This is because the preforming process coaxes the tension from each individual strand.

Broken Form-Set wires lie perfectly flat; they don't bush out to snag on hands or clothes. You can see for yourself by cutting some Form-Set rope. No flying apart at the ends. You have to *lift* each strand or wire to get it apart from its mates.

But the most valuable feature of preformed rope is its great flexibility. Being relaxed, it naturally bends more easily over your sheaves and drums. This means far less bending fatigue . . . and that, in turn, means longer life . . . greater economy.

Every grade, size, and type of Bethlehem wire rope is available in the Form-Set construction. Get full particulars from the nearest Bethlehem office or distributor.



A cut section of Form-Set rope. The strands have been purposely lifted apart. They can't spring up by themselves, for the tension, the urge to uncoil, has been removed by preforming.

When you think WIRE ROPE BETHLEHEM STEEL **think BETHLEHEM**

. . . not with the Gardner-Denver Backfill Tamper! This tamper mechanically compacts the backfill to meet the most exacting requirements—*and does it fast.*

Easily walked over the fill and balanced for smooth handling, the Backfill Tamper cuts down operator fatigue. Power consumption is remarkably low. And neither the valve nor the exhaust has a tendency to freeze in cold, damp weather.

Speed up operations with the rugged Gardner-Denver Backfill Tamper. For complete information, write Gardner-Denver Company, Quincy, Illinois.

INTEGRAL OIL RESERVOIR *assures complete lubrication.*

CYLINDER BORE SPECIALLY BURNISHED—*highly wear-resistant.*

LOW LIFT END SEATING VALVE *provides efficient piston action over a long period of time.*

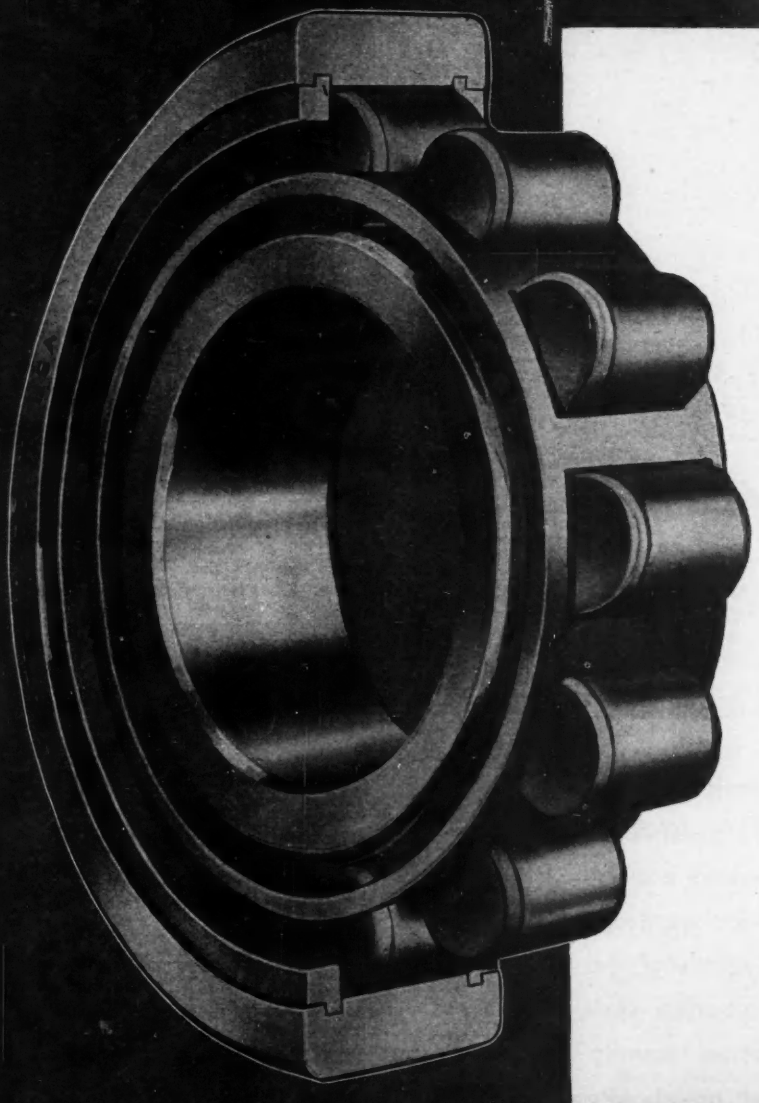
TAMPING PAD FIRMLY SECURED *on piston rod by tapered shank and tapered lock nut.*

DESIGNED FOR SIMPLE MAINTENANCE.

GARDNER-DENVER

Since 1859

Rollers Roll—



FOR THE FIFTY-FOURTH YEAR Hyatt Roller Bearings go rolling along—carrying loads—reducing friction — enabling machines to do their jobs better—and at less cost for power and maintenance.

★

Hyatt Bearings have won the confidence and earned the preference in many fields—mills and factories—farms—railroads — highways — everywhere. ★

Hyatt engineering service with its vast experience as bearing specialists is at your service—write us. Hyatt Bearings Division, General Motors Corporation, Harrison, N. J.; Chicago; Detroit; Pittsburgh; Oakland, California.

HYATT

ALWAYS DUMPS FAST BECAUSE IT'S ALWAYS VERTICAL . . .

On super-elevated curves or whenever the *twinbatch* is not on a level grade, dumping efficiency of its distributing bucket remains unimpaired. Patented oscillating boom — found only on Koehring pavers — keeps bucket vertical at all times. Because bucket always stays vertical, full width of the twin doors is utilized when dumping. Fast *twinbatch* pouring cycle is never slowed down. Bucket load remains distributed equally over four steel trolley wheels to insure smooth bucket travel. Paver frame and boom channels are not subjected to twisting strains, regardless of the position of the paver.

KOEHRING COMPANY • *Milwaukee 10, Wis.*

KOEHRING HEAVY DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT

are you getting the benefits of OTIS MAINTENANCE SERVICE?

In the past ten years the number of Otis elevators under Otis Maintenance more than doubled. It also more than doubled in the previous ten years.

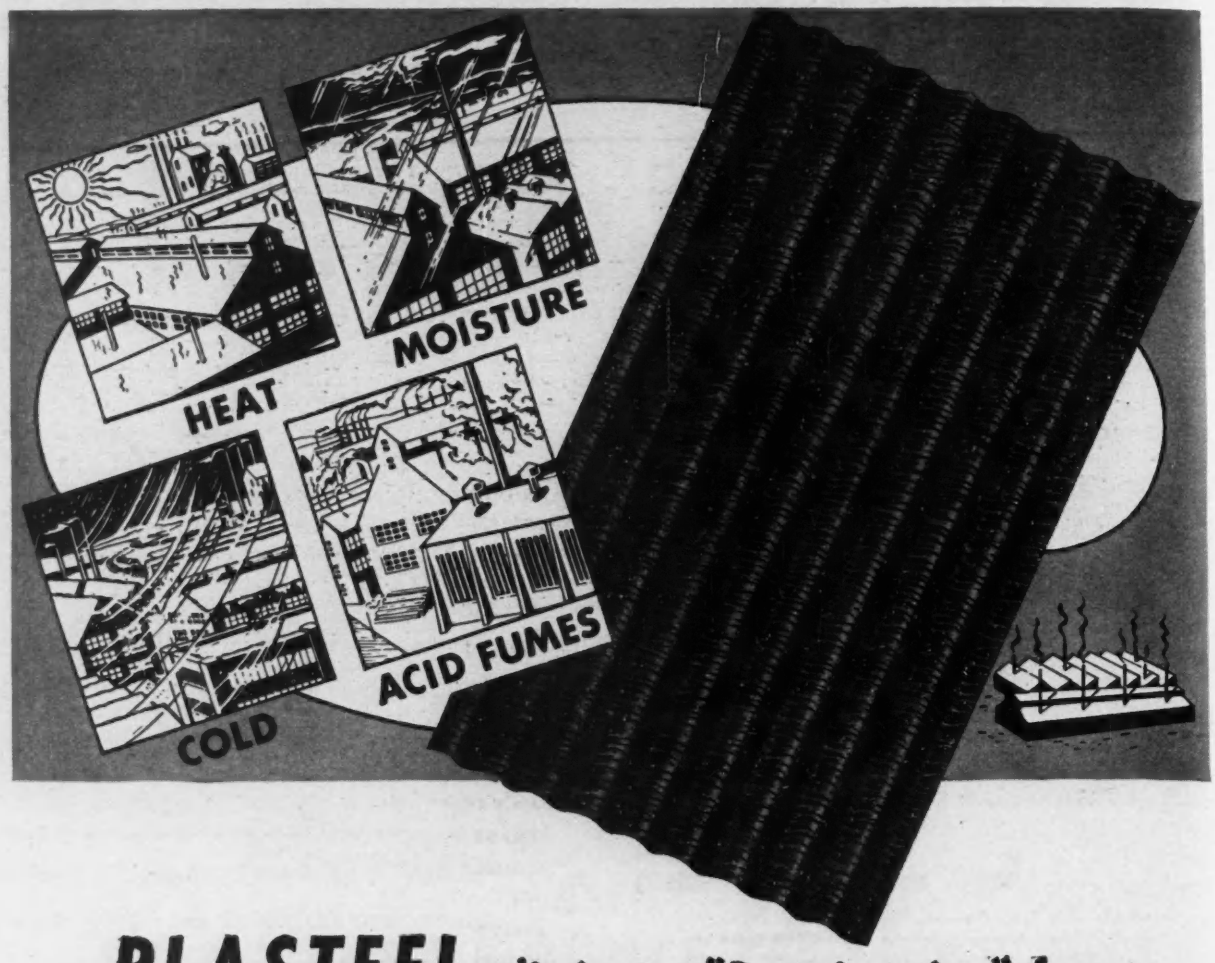
Under Otis Maintenance building owners and managers are freed from all details of elevator care and repair. At the same time tenant satisfaction is increased, more freight is moved and time saved. Those are the reasons why owners and managers know that Otis Maintenance pays.

Otis Maintenance is a home town service because it operates through 245 branch offices, each adapted to the area it serves. It is an integrated national enterprise because it brings the research, engineering and production facilities of the manufacturer directly to your door.

Otis Maintenance is for Otis elevators. It is available at a flat monthly rate through your local Otis office.

Not only long Otis life, but peak Otis efficiency. This Otis maintenance man is checking the speed of an elevator to be sure it is delivering good service.

Otis ELEVATOR COMPANY
OFFICES IN ALL PRINCIPAL CITIES



PLASTEEL eliminates "Deterioration" from ROOFING • SIDING and building accessories

Modern construction methods introduced steel into buildings because it was the lightest and strongest (compared to bulk and weight) material that could be used. Ever since its first use builders have been striving to achieve PERMANENCY in steel construction—freedom from deterioration, rust and corrosion.

PLASTEEL—the physical and chemical combination (by heat and pressure) of Plastics—Steel and pure Mineral Mica has accomplished this in roofing, siding and building accessories.

The steel core gives this Modern Permanent Material the desired strength—the Plastic gives it the protection from deterioration caused by fumes, weather and atmospheric conditions, by hermetically sealing the pores and surfaces of the steel or metal. And the Mica gives it the final protective finish and appearance . . . the ideal combination that provides permanent protection.

Plasteel requires no maintenance—no painting—no patching—because there is no rust deterioration. Let us send you samples and complete data. Write, wire or phone!

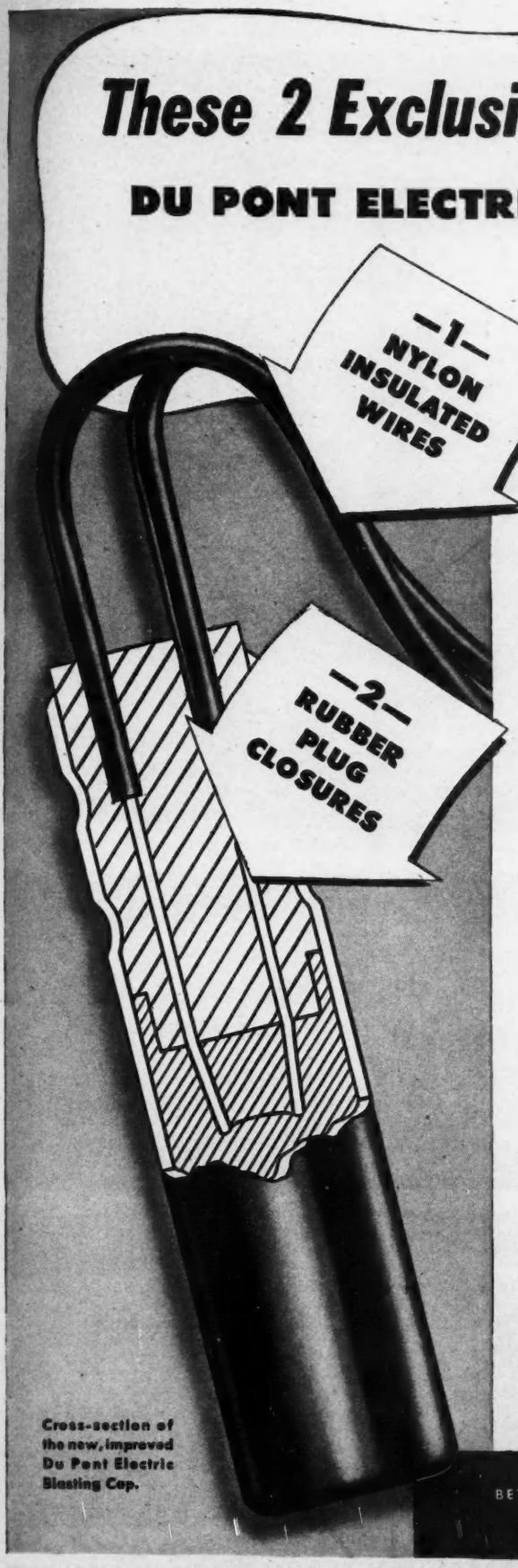
PROTECTED STEEL PRODUCTS

Standard Life Bldg., Pittsburgh, Pa. · Plant: Washington, Pa.

These 2 Exclusive Features Make

DU PONT ELECTRIC BLASTING CAPS

Safer...



Cross-section of the new, improved Du Pont Electric Blasting Cap.

The possibilities of dangerous and costly misfires are cut to a minimum when Du Pont Instantaneous and Delay Electric Blasting Caps are used. Two exclusive features—Nylon-insulated Wires and Rubber Plug Closures—provide added safety measures.

Check the advantages of these features:

LESS CURRENT LEAKAGE—tough, nylon-insulated wires resist abrasion; are equal to enamel in preventing current leakage.

INSULATION READILY REMOVED—nylon-plastic insulation can be easily removed when making connections.

UNAFFECTED BY TEMPERATURE CHANGES—sudden changes in temperature have no effect on the nylon-plastic insulation.

FEWER ERRORS IN HOOKING UP—brilliant colored nylon insulation makes leg wires easy to see . . . assures quick accurate hook ups.

MAXIMUM WATER RESISTANCE—double-crimped rubber plug closures provide maximum water resistance . . . are unaffected by extreme temperatures.

EASIER, SAFER, PRIMING—rubber plug closures permit using cap shells from ½" to 1⅝" shorter. Explosive strength is the same as old-type caps.

Ask your Du Pont Explosives Representative to show you Du Pont Electric Blasting Caps. Use them! You'll find them dependable, safer detonators.

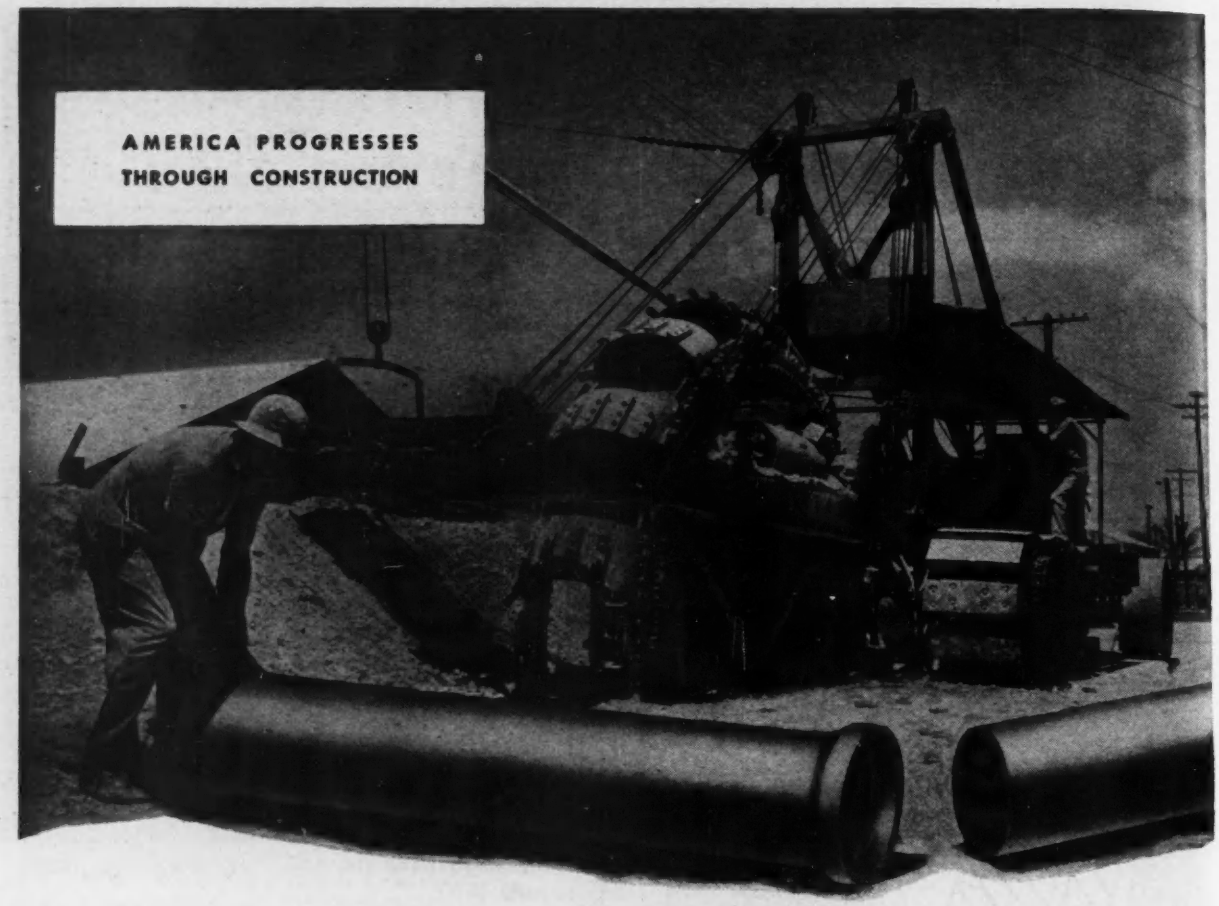
E. I. DU PONT DE NEMOURS & CO. (INC.)
EXPLOSIVES DEPARTMENT
WILMINGTON 98, DELAWARE

DU PONT EXPLOSIVES

BLASTING SUPPLIES AND ACCESSORIES

BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

DU PONT



Adequate "Facilities For Living" Needed!

RIGHT NOW—just about every community needs expansions to its water and sewer systems—more streets and sidewalks, schools, hospitals, playgrounds, stores, fire stations, post offices, gas lines and other projects—as cities are extended and housing is built.

For each new house or apartment an additional $2,000 in construction is needed, on the average, for these municipal facilities. In the next few years the nation will need $5,000,000,000 worth of this type of work.

For greatest efficiency and economy in the construction of these projects necessary for the growth of communities—to save time and money for the taxpayer—A.G.C. general contractors can be depended upon for the skill, integrity, and responsibility for which this emblem stands.

SKILL · INTEGRITY · RESPONSIBILITY

This advertisement is No. 7 of this series

THE ASSOCIATED GENERAL CONTRACTORS of AMERICA, INC.

More Than Ninety Branches and Chapters Throughout America
National Headquarters—Munsey Building, Washington 4, D. C.

SKILL, INTEGRITY AND RESPONSIBILITY IN CONSTRUCTION OF BUILDINGS, HIGHWAYS, RAILROADS, AIRPORTS AND PUBLIC WORKS

COMBUSTION EFFICIENCY

Correct Fuel Distribution in Firebox Cuts Boiler's Coal Need 15%

PATENTED, PRECISION INSTRUMENT INSTANTLY ANALYZES COMBUSTION GASES

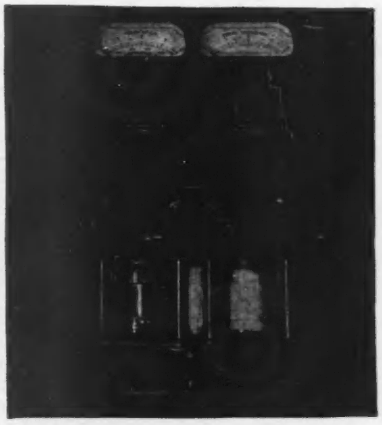
Lubrication Engineer's Report

"A check on a boiler in a customer's* plant at Niles, Michigan, demonstrated how the Cities Service Heat Prover shows the fuel saving possible when the boiler is operating efficiently.

"On most under-feed stokers, there is greater depth of burning coal over the retort—leaving the sides and end of the grates with a thin layer of coal. This thin layer of hot coal soon burns through in spots leaving holes in the fire so that the grates are not covered entirely with coal. These bare spots on the grates allow the air to circulate through the firebox without coming in contact with the burning coal, thus increasing the stack temperature with attendant loss of combustion efficiency.

Grates Evenly Covered

"At intervals of thirty minutes, we took a poker, pushed the hot coal from the center, covering the holes and edges of the firebox with coal so that every part of the grates was covered. This registered highest efficiency on the Heat Prover dials.



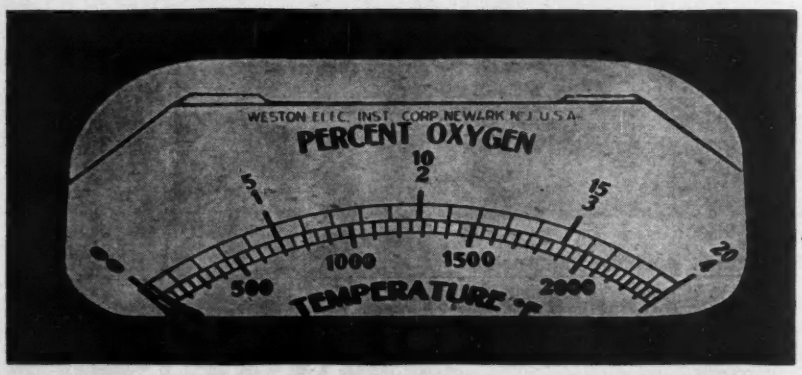
Fuel Cut 3000 lbs. Daily

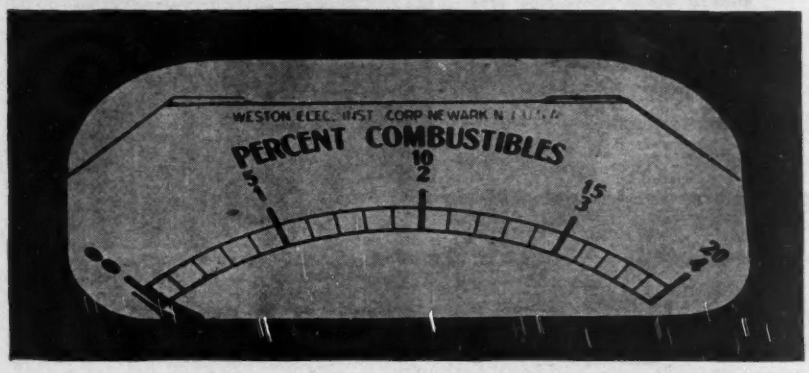
"This boiler was using 18,000 pounds of coal a day and by covering the holes in the fire every thirty minutes, daily consumption was reduced 3,000 pounds a day or a saving of about 15% to 17%."

Heat Prover Service Available

The Heat Prover is a portable combustion gas analyzer patented by Cities Service and operated by trained Cities Service engineers. It is used to check efficiency of every type of fuel combustion equipment. For information call your nearest Cities Service branch office, (Arkansas Fuel Oil Co., in the South); or write to Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.

**Name on request.*





These dials on the compact portable Heat Prover instantly register an analysis of flue gases.

CITIES SERVICE OILS
ONCE-ALWAYS

FOR EVERY LUBRICATION PROBLEM CALL Cities Service FIRST!

SERVING YOU THROUGH SCIENCE

TOUGH?

it's got to be tough!

Tough construction, logging, strip-mining or excavation jobs call for tough tires. Every inch a husky, the U.S. Royal Con-Trak-Tor proves how tough it is with every mile. See your U.S. Tire Distributor now!

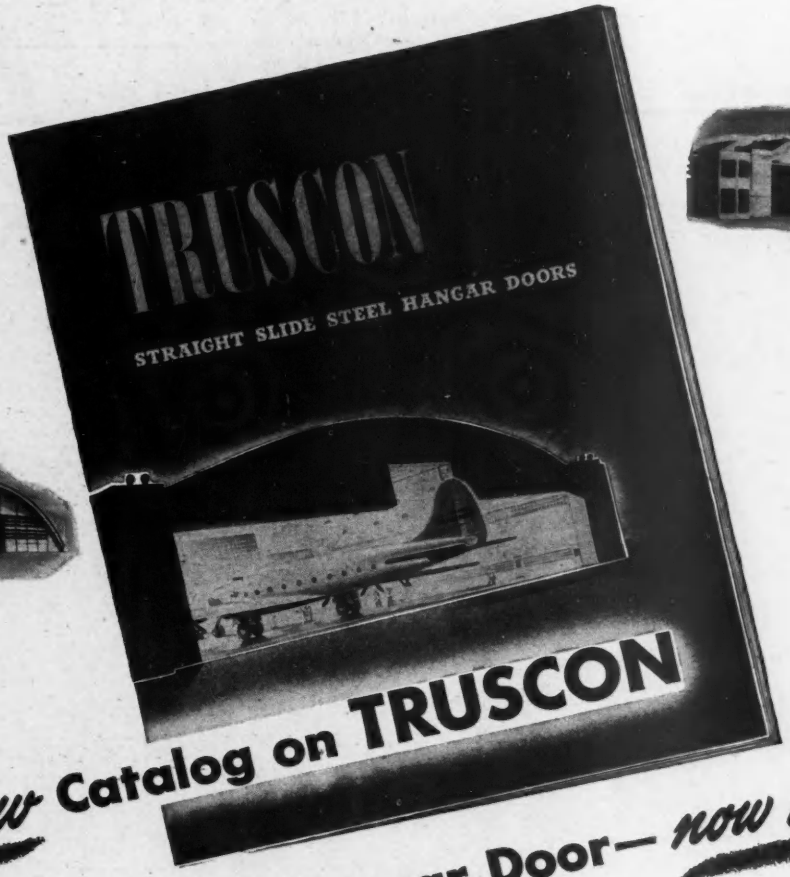
1. **TOUGH DEEP CLEATED TREAD:** insures maximum two-way traction. Prevents rock retention.
2. **TOUGH CENTER RUNNING RIB:** minimizes wear and vehicle vibration on improved roads. Off-the-road, it restricts side slippage without loss of traction.
3. **TOUGH CUT RESISTING TREAD:** rubber is compounded to resist cutting, snagging and bruising.
4. **TOUGH ROUNDED SHOULDERS:** minimize snagging and cutting and improve flotation in soft going.
5. **TOUGH EXCLUSIVE "U.S. SAFETY-BONDED CORD"** construction produces the strongest, longest lasting tire body possible.
6. **TOUGH SHOCK PAD CONSTRUCTION:** extra protection against ruptures and blowouts.

U.S. ROYAL CON-TRAK-TOR TIRES

SPECIFY TOUGH U.S. ROYAL CON-TRAK-TORS FOR LOWER COST PER MILE

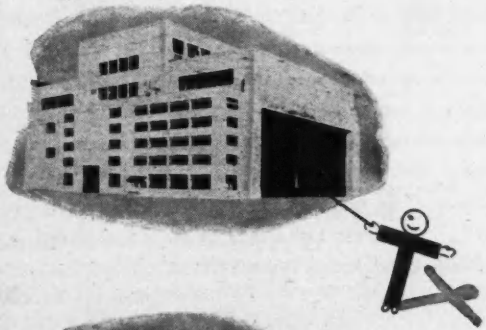
UNITED STATES RUBBER COMPANY

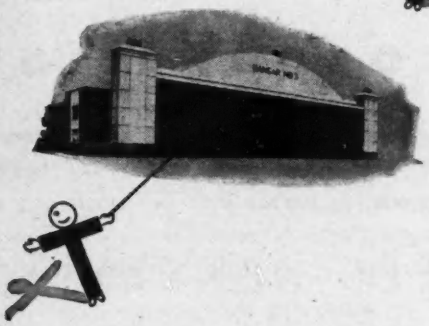
1230 Avenue of the Americas • Rockefeller Center • New York 20, N. Y.



A *New* Catalog on TRUSCON

Straight-Slide Hangar Door— *now ready*





WRITE for your free copy of this new catalog today. It's packed with pictures, mechanical details and valuable reference data that tells how, when and where Truscon straight-slide hangar doors can be used to your greatest advantage.

These doors are fast-operating, smooth running and can be "tailor" made to closely meet the hangar requirements of almost every type of plane, large or small.

For details on how they can be applied to your needs—write for the new booklet, "TRUSCON STRAIGHT-SLIDE HANGAR DOORS." Experienced Truscon hangar door engineers are always at your disposal.

TRUSCON *Steel Company*

YOUNGSTOWN 1, OHIO

Subsidiary of Republic Steel Corporation

MEMBER METAL LATH MANUFACTURERS ASSOCIATION

BREAK THE LOG-JAM *in Housing!*

USE 'INCOR' FOR EARLIER COMPLETION AT LESS COST

RENTAL-HOUSING is needed in a hurry. Speed construction with 'Incor' 24-Hour Cement. 'Incor' concrete is service strong, ready to strip, in a fraction of the usual time . . . result, faster erection speed at substantially reduced cost. On Royal York Apartments, Columbus, Ohio, 'Incor' saved one complete form-set and two sets of shoring. Erection time was advanced by 1½ months, worth $10,500 in rentals to the owner. And 'Incor' saved the contractor $900 net, when this job was built, in 1937. At TODAY'S peak lumber and labor costs, this 'Incor' saving would amount to at least $2070! Plan it for maximum speed, at minimum cost . . . build it with 'Incor'*, America's FIRST high early strength Portland cement . . . save 40-60% on form material and make-up, cut time and overhead, get earlier completion at less cost. Write for "Cutting Concrete Costs" . . . address Lone Star Cement Corporation, 342 Madison Avenue, New York 17.

*Reg. U. S. Pat. Off.

LONE STAR CEMENT CORPORATION

Offices: ALBANY • BETHLEHEM, PA. • BIRMINGHAM
BOSTON • CHICAGO • DALLAS • HOUSTON
INDIANAPOLIS • JACKSON, MISS. • KANSAS CITY, MO.
NEW ORLEANS • NEW YORK • NORFOLK
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LONE STAR CEMENT, WITH ITS SUBSIDIARIES, IS ONE OF THE WORLD'S LARGEST CEMENT PRODUCERS: 15 MODERN MILLS, 25,300,000 BARRELS ANNUAL CAPACITY

POISON IVY MENACE—and How One Foreman Licked It

Poison ivy rash took valuable workers off the job every time they cleared the ground of trees and underbrush . . . lost time increased. Then a new foreman started to train the workers. He taught them how to recognize poison ivy, what protective clothing to wear, how to uproot and burn the plants, what to do if they touched the plant. That ended the poison ivy menace for this crew.

Every foreman should know how to combat poison ivy. If you'd like an authoritative booklet on Poison Ivy, Oak, Sumac and Snakes, we'll be glad to furnish you with free copies for distribution to your foremen. This is one of THE GUIDE LINES, a series of booklets furnished to Liberty Mutual policyholders as one of the many regular services in our construction insurance program.

As the leading writer of Construction Insurance in America, Liberty Mutual has the experience to help you prevent construction accidents, settle claims fairly and promptly, and fully protect you on every job. And no matter where you go, our 105 Branch Offices are prepared to give you the same high grade of service at all times. That's why leading contractors everywhere insure with Liberty Mutual.

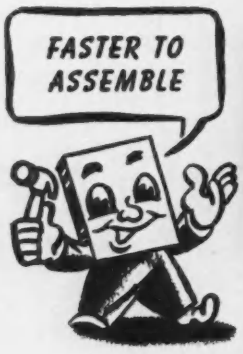
Would you like more information on Liberty Mutual's specialized construction service? Drop us a line today.*

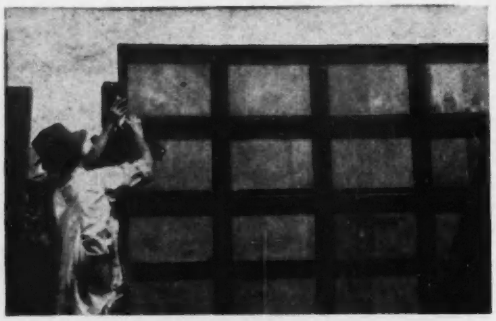
***FREE TO CONTRACTORS**... Here's a booklet your foremen should have. Factual, illustrated, full of information on how to prevent losses caused by poison ivy and the other hazards of rough grading. For your FREE copies, write to: Construction Bureau, Liberty Mutual Insurance Company, 175 Berkeley Street, Boston 17, Massachusetts.

LIBERTY MUTUAL
INSURANCE COMPANY
HOME OFFICE: BOSTON

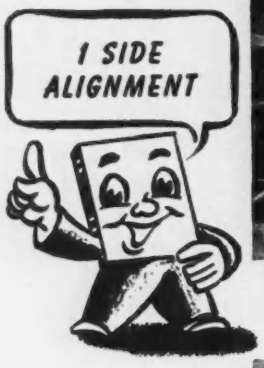
The leading writer of Construction Insurance in America

CONCRETE FORM MATERIAL COST LESS THAN 3¢ PER FOOT

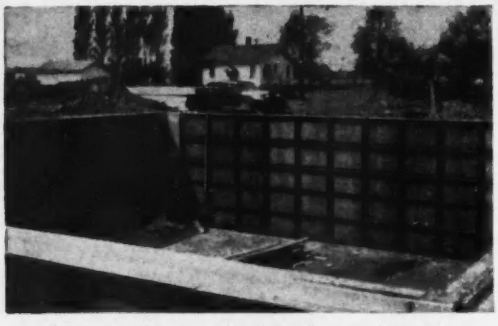




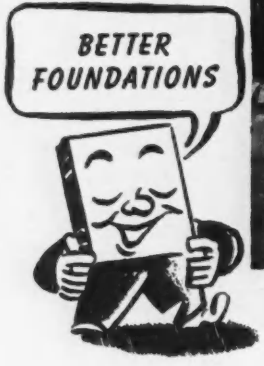
Simple assembly, faster erection of these lightweight panels—one man can handle them—mean "on the job" time and cost savings.

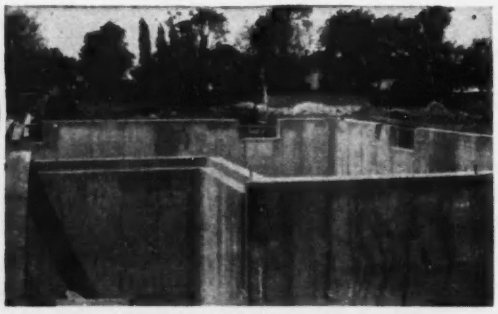


Alignment and bracing required on one side only. Note simplified method of inside corner and filler forming. Erected Panels are "clean"—offer very little obstruction.



Concrete has been poured and Panels are ready to strip. Quick removal of cut nails from Tie ends releases Panels.





Smooth-surfaced, straight walls of uniform thickness—accurate inside and outside corners are assured on every UNI-FORM foundation. Boxing out and brick ledges are very easily handled.

For an initial material cost of *less than 3c per square foot of form area*, you can use the UNI-FORM System of Foundation Panels which comprises a complete, ready-to-use set of panel forms.

COSTS DROP TO LESS THAN 2¢ After FIRST 100 USES

The low cost and long life of UNI-FORM Panels makes them the most economical, most practical prefabricated forms you can buy. From 75-100 re-uses of each Panel are possible before replacement of the plywood is necessary. Rigid, all steel welded frames are virtually indestructible.

UNI-FORM Foundation Panels are complete—there are no extras for you to buy. Because they require alignment on one side only and employ a simplified method of forming inside corners and fillers, minimum lumber is necessary to erect them. Materials savings are considerable.

Simple assembly with the UNI-FORM Tie means faster erection and easier stripping. UNI-FORM Ties lock Panels together to provide tight joints, accurate forming and spreading. Positive alignment assures straight walls of uniform thickness.

YOU CAN GET UNI-FORM FOUNDATION PANELS IMMEDIATELY!

UNI-FORM Panels are furnished in 2′ x 6′, 2′ x 7′ and 2′ x 8′ sizes. UNI-FORM Ties are available to handle any standard wall thickness.

Photos Courtesy BARKER-GOLDMAN-LUGIN CO. SPRINGFIELD, ILL.

Write for complete details, prints, cost analysis and shipping date

Low-Priced

Gas Cutting Machines

THE No. 10 RADIAGRAPH
for cutting straight lines, circles, arcs, and beveled edges

THE No. 10 PLANOGRAPH
for cutting irregular shapes, rectangles, straight lines, arcs, and circles

Here are two inexpensive Airco machines which bring the speed and economy of machine gas cutting within the means of practically any shop engaged in preparing steel plates for welded fabrication.

AIRCO No. 10 RADIAGRAPH — A sturdy, portable gas cutting machine with speed range from 4" to 50" per minute. It will cut straight lines of any desired length . . . bevels up to 45° angle . . . arcs up to 42½ inch radius . . . circles from 3 to 85 inches in diameter.

AIRCO No. 10 PLANOGRAPH — A rugged, reasonably-priced cutting machine of the pantograph type adaptable for single or double torch operation with speed range from 2" to 28" per minute. With work table it occupies an area of only 5' 3" x 10' 9". Has a cutting range of 24" x 72" for single torch operation . . . 12" x 72" each for double torch. Maximum diameters of circles: 24" with a single torch . . . 12" each for double torch operation. Machine can be furnished with manual or magnetic tracing devices for reproducing desired contour from drawings, cams, or templates.

• • •

For further details on the No. 10 Radiagraph ask for Booklet ADC-614C; on the No. 10 Planograph, Booklet ADC-623B. Write your nearest Airco office, or to Dept. E. N., Air Reduction, General Offices; 60 E. 42nd St., New York 17, N. Y.; in Texas: Magnolia Airco Gas Products Co., General Offices, Houston 1, Texas. Represented Internationally by Airco Export Corp.

AIRCO **AIR REDUCTION**
Offices in All Principal Cities

HEADQUARTERS FOR OXYGEN, ACETYLENE AND OTHER GASES . . . CARBIDE . . . GAS WELDING AND CUTTING APPARATUS AND SUPPLIES . . . ARC WELDERS, ELECTRODES AND ACCESSORIES

CONSTRUCTION REPORTS

Proposed Work

(Daily service also available—Write for details)

Compiled by Business News Department—Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.
ELSIE EAVES, Manager J. A. MAHONEY, Reports J. V. McEWEN, M. R. ROESSLER, Statistics

WATER SUPPLY

PROPOSED WORK

★**Calif., Napa**—City, City Hall, pipeline from Conn. Valley Dam to imprv. municipal WW sys. $1,750,000 bond issue approved. A. Kempkey, Balboa Bldg., San Francisco, consult. engr.

Fla., Hallandale—Town, H. C. Schwartz, mayor, water sys. $375,000. W. C. Disbrow, Jr., Hallandale Town Hall, consult. engr.

Ill., Collinsville—City, G. W. Killinger, mayor, 20 in. watermain from city waterworks to elevated tank. $150,000. Financing provided.

Ill., Crete—Village Hall, imprv. WW, incl., water treatment, etc. $117,755. Financing provided. Miller Engineering Service, Marion, consult. engr. CD 4/8—ENR 4/18.

Ill., Kinmundy—City, City Hall, WW and treatment plant. $130,000. E A. Fulton, 3 S. Mermec St., St. Louis, Mo., consult. engr. CD 4/9—ENR 5/2.

Ill., Pana—City, City Hall, imprv. water sys., incl., impounding reservoir, pump. station, raw water transmission line. $193,000. Decatur Engineering Service Corp., Decatur Club, Decatur, consult. engr.

Ill., Roseville—Village, Village Hall, plans completed imprv. WW sys., well, pumping equip., watermain exten., appurtenances. $45,000. Financing provided. Pappmeier Engrg. Co., Roseville, consult. engr.

Ill., Summit—Village Hall, imprv. WW., incl., storage reservoir, pump. station, watermain exten., with connection to city of Chicago watermains and village of Summit water distr. sys. $232,730. Financing provided. W. Wilson, 1509 W. Jackson Dr., Chicago, consult. engr. CD 11/5—ENR 11/29.

Ill., Worden—Village, Village Hall, WW., incl. elevated storage and distr. sys. $168,000. C. Abraham Alton, consult. engr. CD 10/24—ENR 11/15.

Kan., Salina—City, water softening plant Wilson & Co., 223 N. Santa Fe St., consult. engrs. $250,000.

Mo., Appleton—City, L. A. Higgins, mayor, water supply sys. $100,000. Financing not provided. E. T. Archer & Co., Exchange Bldg., Kansas City, Mo., consult. engr.

Mont., Cut Bank—City, W. B. Lee, mayor, bond election in June, addnl. water supply, watermain exten., sewers and treatment plant. $200,000. Corwin & Co., Medical Arts Bldg., Great Falls, consult. engrs. CD 2/9—ENR 2/22.

N. C., Roanoke Rapids—City, c/o Roanoke Rapids Sanitary Dist., Roanoke Rapids, water distr. sys., incl. 50,615 lin. ft. 2½-to 8-in. c.i. pipe and fittings, 101 gate valves and 51 fire hydrants. $105,000. Wm. C. Olsen, Raleigh, consult. engr. CD 6/13.

Ore., Forest Grove—City, City Hall, voted bonds, concrete reservoir and water sys. imprvs. $300,000. Cornell, Howland, Hayes & Merryfield, Smith Bldg., Corvallis, consult. engrs. CD 4/25—ENR 5/16.

S. C., Easley—City, City Hall, exten. water sys., incl. 4 mi. 8 in. iron pipe and 500,000 gal. water tank. $100,000.

Tenn., Fayetteville—Town, c/o mayor, 1,250,000 g.p.d. WW. sys. and treatment plant. $200,000. Hart, Freeland & Roberts, 3rd Nat'l Bank Bldg., Nashville, consult. engrs.

★**Tex., Beaumont**—City, City Hall, exten. c.i. distr. lines and addnl. supply facilities, etc. $1,100,000. Financing provided. G. Schaumburg, City Hall, engr.

Tex., Freeport—Dow Chemical Co., Freeport, Oyster Creek Dam for fresh water supply. $100,000. Financing provided. M. P. Fox, Freeport, consult. engr.

Tex., Port Acres—Jefferson County Water Control & Imprvt. Dist. 6, c/o M. R. Jefferson, Beaumont, WW. sys. $129,000. Financing provided. J. J. Rady, Insurance Bldg., Fort Worth, consult. engr.

Tex., Taylor—City, W. R. Arrington, mayor, City Hall, voted $100,000 bonds, exten. c.i. water distr. lines, drilling, casing and completely developing new water supply well.

Vt., Hartford—Town, development water sys. $110,000.

Vt., St. Albans—City, filtration beds and pipeline (6 mi.), at Georgia and Fairfax, $130,000. C. T. Main, Inc., 201 Devonshire St., Boston, Mass. CD 2/20—ENR 3/7.

Vt., Windsor—Village Water Dpt., addn. to water sys., reservoir and mains. $100,000. Financing not provided.

Vt., Winooski—City, plans under way elevated water storage tank, $40,000. Joseph F. Leclair, supt. Water Dpt.

Wash., Pullman—Washington State College, Pullman, 2 m.g. rein.-con. reservoir, elevated steel tower with 100,000 gal. water tank, addnl. pump. units and imprv. water distr. sys. $200,000. Financing provided. Stevens & Koon, Spalding Bldg., Portland, Ore., consult engrs.

Que., Cowansville—Town, aqueduct, $350,000. A. Crepeau, 45 Wellington St. N., Sherbrooke, engr.

SEWERS, WASTE DISPOSAL

PROPOSED WORK

Ark., Pine Bluff—A. E. Triplett, atty, for Jefferson Co. Drain Dist., Pine Bluff, drainage sys. for Waterloo Drainage Dist. $140,000. A. E. Heagler, city engr.

Calif., Los Angeles—Los Angeles Co., Hall of Records, sanitary sewers in Arline Ave. and other streets, CI 1169, $72,000; Fairway Blvd. and other streets near View Park, $122,800. A. Jones, Hall of Records, engrs.

Ga., Decatur—City, A. F. Newman, mgr., plans nearing completion, sanitary sewers. $100,000. F. M. Daves, 774 Spring St. NW, Atlanta, consult. engr. CD 8/29/45—ENR 9/20/45.

Ill., Louisville—City, J. Tant, mayor, sewage treatment plant, auxiliaries, appurtenances, piping, 8 and 10 in. main and lateral sewers, $109,020. Russell & Axon, 6635 Delmar Blvd., University City, St. Louis 5, Mo., consult. engrs. CD 4/15—ENR 5/2.

Ill., Wamas (Centralia PO.)—Village, A. P. Begham, clk., sewage disposal plant, auxiliaries and sewerage sys, etc. $100,000.

Minn., Columbia Heights—Village, P. T. Olsson, mgr. voted $275,000 bonds, trunk and sanitary sewers extens. R. D. Thomas & Associates, 1200 2 ave S., Minneapolis, consult. engrs. CD 5/2—ENR 5/16.

Miss., Greenwood—City, A. D. Saffold, mayor, exten. storm sewerage sys. Over $200,000.

★**Mo., Joplin**—City, J. J. Saunders, comr.,, plans $700,000 bond election, sewage plant. H. T. Lawrence, 1802 N.W. 21 St., Oklahoma City, Okla., consult. engr. CD 6/29/45—ENR 7/12/45.

Mo., Lebanon—City, City Clerk, City Hall, voted $105,000 bonds enlarging, imprv. sewage disposal plant. Burns & McDonnell Engineering Co., 107 W. Linwood Blvd., Kansas City, Mo., consult. engr. CD 2/7/45—ENR 2/22/45.

Mo., Rolla—City, storm sewers. $134,987 Black & Hawthorne, Uptown Theatre Bldg., consult. engrs. CD 8/2/44—ENR 8/24/44.

Mont., Malta—City, R. Monroe, mayor, sewers and watermains $180,000; storm sewers $150,000. Corwin & Co., Inc., Medical Arts Bldg., Great Falls, consult. engr.

Neb., North Platte—City, sewage plant, $350,000. Financing not provided. Burns & McDonnell, 107 W. Linwood Blvd., Kansas City, Mo., consult. engrs. CD 9/19/45—ENR 9/27/45.

N. D., Hatton—City, E. Oeling, mayor, City Hall, plans under way, sewers and sewage plant. $105,000. Financing not provided, Lium & Burdick, Grand Forks, consult. engrs.

Okla., Bethany—City, F. Jernigan, city clk., defeated bonds, sewage disposal plant. $100,000. V. G. Thompson, Cotton Exchange Bldg., Oklahoma City, consult. engr. CD 4/26—ENR 1/10.

Ore., Forest Grove—City, City Hall, voted bonds treatment plant and new sewers. $400,000. Cornell, Howland, Hayes & Merryfield, Smith Bldg., Corvallis, consult. engrs. CD 4/25—ENR 5/16.

Pa., Connellsville—City, City Hall, plans under way, 1 story, brick sewage disposal plant, pump house. $436,700. Morris Knowles, Park Bldg., Pittsburgh, engr. CD 10/25—ENR 11/15.

★**Pa., Lemoyne**—Lemoyne Boro, Boro Hall, installing sewerage sys. $550,000. W. H. Corddry, c/o Gannett, Flemming, Corddry & Carpenter, 600 N. 2 St., Harrisburg, consult. engr.

Tex., Houston—Harris Co., c/o Flood Control & Fresh Water Dist. 17, Courthouse Bldg., plans 30% completed disposal plant. $400,000. Financing provided. Howe & Wise, 610 Stewart Bldg., consult. engrs.

Tex., Mineola—City, M. Caudle, mayor, sewerage sys. $105,000. W. C. Hedrick, Box 4265, Dallas, consult. engr.

Tex., Port Acres—Jefferson County Water Control & Imprvt. Dist. 6, c/o M. R. Jefferson, Beaumont, sanitary and storm sewerage sys. $167,000. Financing provided. J. J. Rady Insurance Bldg., Fort Worth, consult. engr.

★**Tex., San Antonio**—City, G. B. Mauerann, mayor, City Hall, defeated bonds, sanitary sewers, $2,000,000; storm sewers, $1,100,000; addnl. incinerator or disposal plant, $1,000,000. CD 4/26—ENR 5/16.

Tex., Temple—A. E. Taylor, city mgr., sewer line extens., $85,000; storm sewers, $395,000. J. Montgomery, Nalle Annex Bldg., Austin, consult. engr. CD 5/23—ENR 6/13.

Tex., Ysleta—El Paso Water Control & Imprvt. Dist. 1, Ysleta, imprv. sanitary sewerage sys. $175,000 bonds voted. Freese & Nichols, 407 Danciger Bldg., Fort Worth, consult. engrs.

★**Wash., Spokane**—City, City Hall, voted $1,700,000 bonds, disposal plant, interceptng sewers, trunk sewers, lateral sewers and sewer replacements, $4,000,000. Greeley & Hansen, 6 N. Michigan Ave., Chicago, Ill., consult. engrs. C. E. Davis, city engr. CD 4/30—ENR 5/16.

Wash., Walla Walla—City, City Hall, exten. sewerage sys., $75,000; enlarging sewage treatment plant, $150,000. Financing not provided. Stevens & Koon, Spalding Bldg., Portland, Ore., consult. engrs. G. C. Cookerly, City Hall, city engr. CD 7/25—ENR 8/9.

BRIDGES

PROPOSED WORK

Conn., Norwalk—City, Municipal Offices, City Hall, Norwalk, bridges, improvs., reconstruction, James and Washington Sts. $45,000.

★**N. H., Portsmouth**—City, bridge and approaches, North Mill Pond Crossing of Maplewood Ave., Proj. No. 1-27-P-35. $512,000. Alfred T. Granger Associates, Hanover, consult engrs.

Ontario—Province of Ontario, Toronto, concrete, steel bridge over Sturgeon River, in Field, $200,000; overhead bridge at railway crossing, Warren, $45,000. Dpt. Hys., Toronto, engr.

STREETS AND ROADS

PROPOSED WORK

Calif., North Sacramento—City, City Hall, paving, repaving, curbs and gutters. $85,510. Drury Butler & O. L. Caen, Nicolaus Bldg., Sacramento, consult. engrs.

★**Ga., Macon**—City, paving 40 city streets. $500,000. W. Walker, city engr.

Ia., Council Bluffs—Pottawattamie Co., Council Bluffs, road imprvs. $145,400. P. J. Mahoney, co. engr. CD 12/15/44—ENR 12/28/44.

Ia., Audubon—Audubon Co., City Hall, road imprvs. $200,000. M. Rubek, co. engr.

Ia., Waverly—Bremer Co., imprv. roads. $196,595. W. S. Chapmen Co., Waverly, consult. engrs.

★**Kan., Kansas City**—City, street imprvs. $3,467,003. T. Schlup, city engr.

Miss., Laurel—City, J. C. Miller, mayor, urban streets. $350,000. H. A. Mentz, Laurel, consult. engr.

Miss., Morton—City, W. W. Lovett, mayor, street imprvs. $180,000. J. B. Williams, Yazoo City, consult. engr.

Miss., Waynesboro—Town, c/o mayor, paving streets and sidewalks. $160,000. G. W. Wier, 946 N. Congress St., Jackson, consult. engr.

★**N. Y., Buffalo**—Bureau Contrs. & Accounts, Albany, constructing Erie-Ontario and Niagara Thruways in Buffalo Urban Area, $46,000,000; city arterial route construction incl. Delaware Ave., Humboldt, Parkway, Broadway, Perry St., Fuhrmann Blvd., Kensington Ave., Cherry, Elm, Oak, Michigan, Tupper, Carolina and Virginia Sts., Walden and Hinman Aves., $23,545,000.

★**Tex., Temple**—A. E. Taylor, city mgr., City Hall, plans under way, street paving, $508,979; street imprvs., $60,000. J. Montgomery, Nalle Annex Bldg., Austin, consult. engr.

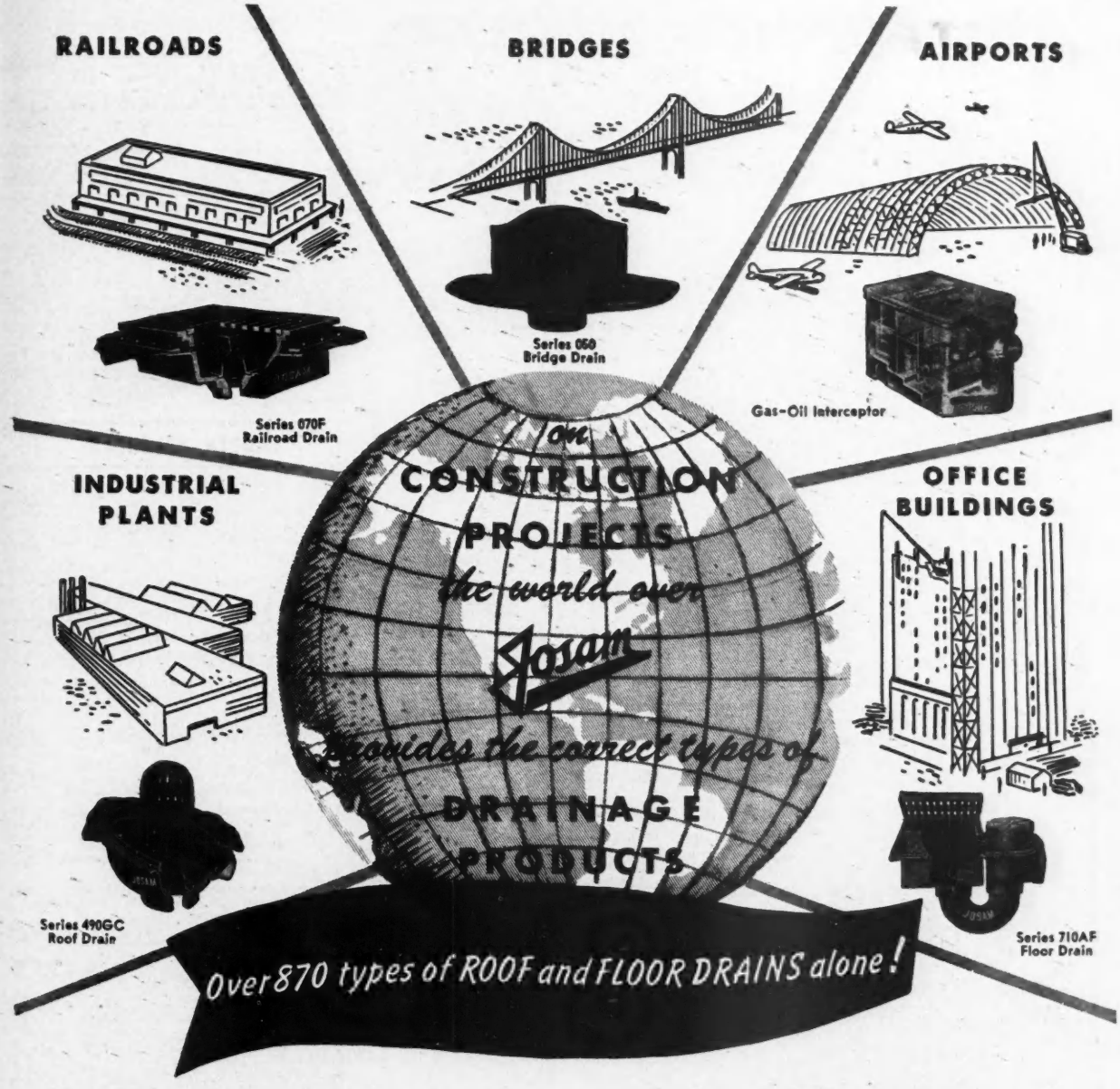
Ontario—Province of Ontario, Toronto, constructing road northwards, Temagami. $70,000. Dpt. Hys., Toronto, engr.

Ontario—Province of Ontario, Toronto, paving highway between Duntroon and Collingwood. $100,000. Dpt. Hys., Toronto, engr.

Ont., Highland Creek—Province of Ontario, Toronto, concrete paving. $100,000. Dpt. Hys., Toronto, engr.

Ont., London—London Suburban Rds. Comn., London, paving 4 mi. Oxford St. from city limits to London Airport. $120,000. W. R. Smith, County Bldgs., engr.

Quebec—Province of Quebec, Quebec City, constructing roads, Desmeules, $60,000; Ste. Angele de Laval, $90,000. Dpt. Rds., Quebec City, engrs.



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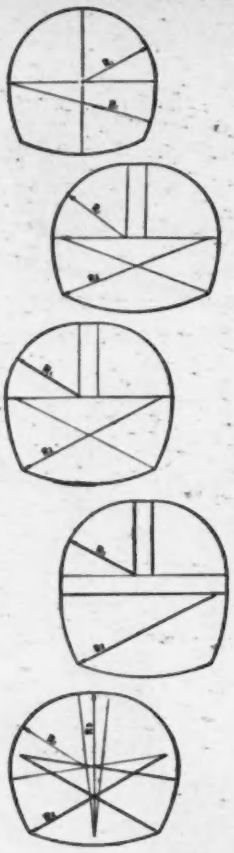

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BLAW-KNOX STEEL FORMS

STREETS AND ROADS (Proposed Work, Cont'd.)

Que., Cap de la Madeleine—City, F. Beaumier, clk., asphalt street paving. **$100,000.** J. E. Fleury, c/o owner, engr.

Saskatchewan, Corinne — Province of Saskatchewan, Regina, grading 14 mi. road in Corinne. **$85,000.** Dpt. Hys. & Transportation, Regina, engrs.

EARTHWORK, WATERWAYS

PROPOSED WORK

Ore., Grants Pass—Grants Pass Irrigation Dist., Grants Pass, imprv., exten. canals. **$160,000.**

Tex., San Antonio—Alamo Soil Conservation Dist., c/o W. L. Jones, Chamber of Commerce, soil conservation project, incl. grading, revetments, ditching, water reservoirs, drainage, etc. **$125,000.** Financing provided.

★**N. S., Digby**—Dominion Govt., c/o Dpt. Agriculture, Ottawa, Ont., reclamation 1,000,000 acres marshlands for farming purposes. **$1,000,000.** Dpt. Pub. Wks., Ottawa, Ont., engrs.

LATIN AMERICA

Argentina, Ezeiza—Govt. of Argentina, Buenos Aires, plans airport. **$1,000,000.** Dpt. P. Wks., Div. Sumosistros, Avenida Julio a Rosas 537, Buenos Aires, engr.

Bolivia—Republic of Bolivia, La Paz, plans road construction from La Paz to lowlands in Dpt. of El Beni. **1,500,000** Bolivianos. Bolivian Development Corp., La Paz, engr.

Bolivia, La Paz—Co-Operativa Electrica de La Paz, S.A., La Paz, plans average 4,000 hp and max. 6,000 hp. power plant. **$1,000,000.**

Bolivia, La Paz—Syndicate c/o Dpt. Industry, La Paz, plans cement and asbestos plant. **15,000,000** Pesos.

Bolivia, Santa Cruz—Republic of Bolivia, La Paz, plans electric power installation. Over **$100,000.**

Brazil, Sao Paulo—Chaim & Yazbech, Ltd., Rua Oliveria Alves, 160, Sao Paulo, plans plastic mfg. plant. **$150,000.**

Brazil, Sao Paulo—F. Del Mero & Cia Praca Princeza Isabela 196, Sao Paulo, plans paste board box, etc. mfg. plant. **$100,000.**

British Honduras—British Honduras Govt., Belize, plans road construction in Belize, **$230,000**; completing gap between Belize and Cayo, **$310,000**; steel bridge over Belize River 5 mi. west of Belize, **$250,000.** Dpt. Wks., Belize, engr.

Chile, Concepcion—Caga de la Habitacion, Santiago, plans dwelling units. **$500,000.**

Chile, Concepcion—Caga de Sequro Obrevo, Concepcion, plans 200 dwellings for coal miners. **$645,161.**

Chile, Santiago—Caga de la Habitacion, Santiago, plans housing units. **$400,000.**

Colombia, Bogota—Republic of Colombia, Bogota, plans highway machinery, **15,000,000** Pesos. Dpt. National Hys., Bogota, engrs.

Colombia, Bogota—Shaio Higos & Co., Calle 12-56, Bogota, plans textile plant exten. **$100,000.**

Costa Rica, San Jose—Republic of Costa Rica, San Jose, plans by Costa Rican Social Security Bd., San Jose, dwellings. **$2,000,000.**

Guatemala, Antigua—Municipality, Antigua, plans WW sys. **1,000,000** Quetzales.

Mexico, Mexico City—Aves Congeladas, S. A., Fresno, 56-b, Mexico, D.F., plans poultry refrigeration and freezing plant. **$300,000.**

Mexico, Mexico City—Bush SA Pasco de la Reforma 107, Despacho 401, Mexico City, plans 200 room hotel. **$350,000.**

Mexico, Mexico City — Refrigeracion y Congelacion Ardo, 143, Mexico, D.F., plans vegetables, fruit, eggs, fish and seafood refrigeration and freezing plant. **$350,000.**

Mexico, Tlalnepantla—Aceros Nacionales, S.A., Apartado 16, Tlalnepantla, plans steel sheet bar factory. **$250,000.**

Panama, Chitre—Storage Co., Ltd., Chitre, plans exten. freezing plant. **$100,000.**

Peru, Lima—N. H. Nicholson, Ltd., Avenida Orrantia 1465, Lima, plans canning factory, etc. **$150,00.**

Santo Domingo, Ciudad Trugillo—Republic of Dominica, Ciudad Trugillo, plans airport. **$310,000.** Dpt. P. Wks., Ciudad Trugillo, engr.

Santo Domingo, Ciudad Trugillo—Republic of Dominica, Ciudad Trugillo, plans exten. breakwater 1,000 ft., rein.-con. 850 ft. bulkhead, two 60x300 ft. steel, concrete warehouses, **$2,117,920.** Dpt. P. Wks., Ciudad Trugillo, engr. CD 3/27/45—ENR 3/29/45.

Santo Domingo, Long Beach—Republic of Dominica, Ciudad Trugillo, plans hotel. **$400,000.** Dpt. P. Wks., Ciudad Trugillo, engr.

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COMMERCIAL BUILDINGS

PROPOSED WORK

★**Ala., Mobile**—Southeastern Investment Co., A. A. Evans, pres., Merchants Natl. Bank Bldg., residential project on 48 acre tract. **$3,000,000.**

★**Calif., Auburn**—G. C. Goheen & Goheen Constr. Co., Sycamore St. and Highway, Mill Valley, 100 home sub-division. To exceed **$500,000.**

★**Calif., Concord**—G. C. Goheen & Goheen Constr. Co., Sycamore St., and Highway, Mill Valley, 170 home sub-division. To exceed **$850,000.**

★**Calif., Los Angeles**—Pacific Homes, 1055 N. Kingsley Dr., plans 50% completed by C. Faithfull, 4453 Victoria Park Dr., Class A, rein.-con. brick, 70 to 80-bed hospital. **$1,000,000.**

★**Calif., Los Angeles**—Times-Mirror Co., 202 W. 1 St., 10 story television bldg. **$3,000,000.**

★**Calif., Mill Valley**—G. C. Goheen & Goheen Constr. Co., Sycamore St. and Highway, 130 home sub-division. To exceed **$650,000.**

★**Calif., Oakland**—Pacific Telephone & Telegraph Co., 140 New Montgomery St., San Francisco, plans by H. A. Thomsen, Jr., 315 Montgomery St., San Francisco, 6 story, steel, frame, telephone bldg. **$2,000,000.** CD 1/4—ENR 1/17.

★**Calif., Roseville**—G. C. Goheen & Goheen Constr. Co., Sycamore St. and Highway, Mill Valley, 100 home sub-division. To exceed **$500,000.**

★**Calif., San Carlos**—R. D. Gover, 616 Cedar Ave., 100 homes, Bayview Heights tract. **$1,000,000.**

Calif., San Francisco—Pacific Gas & Electric Co., 245 Market St., plans by Weihe, Frick & Kruse, 251 Kearny St., office bldg. replacing 17 story office. Over **$150,000.** Hall & Pregnoff, 251 Kearny St., consult. engrs.

Calif., San Francisco—Hahnemann Hospital, 2698 California St., plans by D. D. Stone & L. B. Mulloy Assoc., 581 Bush St., hospital wing. Over **$150,000.** CD 4/18—ENR 4/25.

Calif., San Leandro—National Dollar Stores, 929 Market St., San Francisco, plans by O. A. Deichmann, 1026 Market St., San Francisco, 1 story department store. **$250,000.**

Conn., Glastonbury—Laura Hale Gorton, Main St., housing, on 45 acre site, Knob Hill Rd. and Newell Lane. Over **$205,000.** Financing not provided.

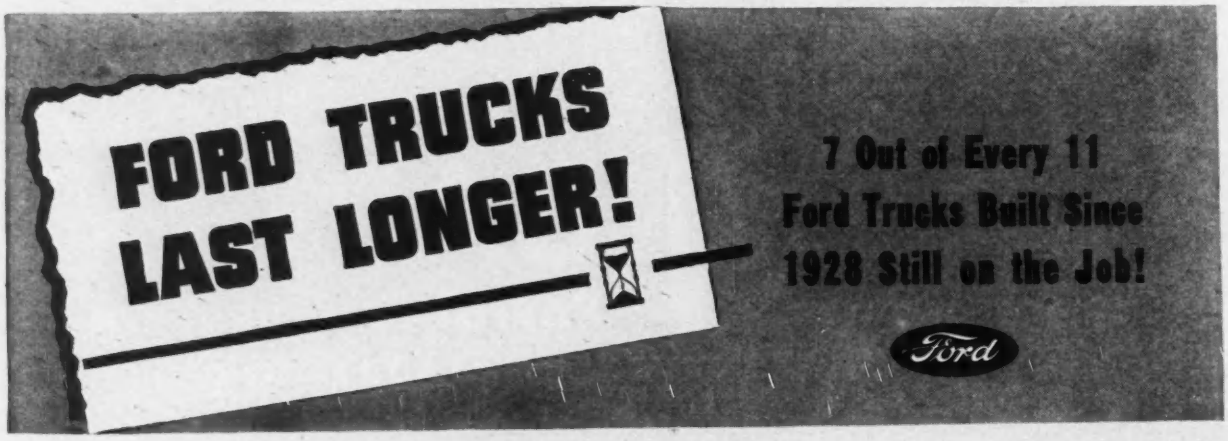
Conn., Stratford—Duncan Nairn, et al, 170 White St., 45 frame houses, Outspring Rd. and Wigwam Lane. **$300,000.** Financing not provided.

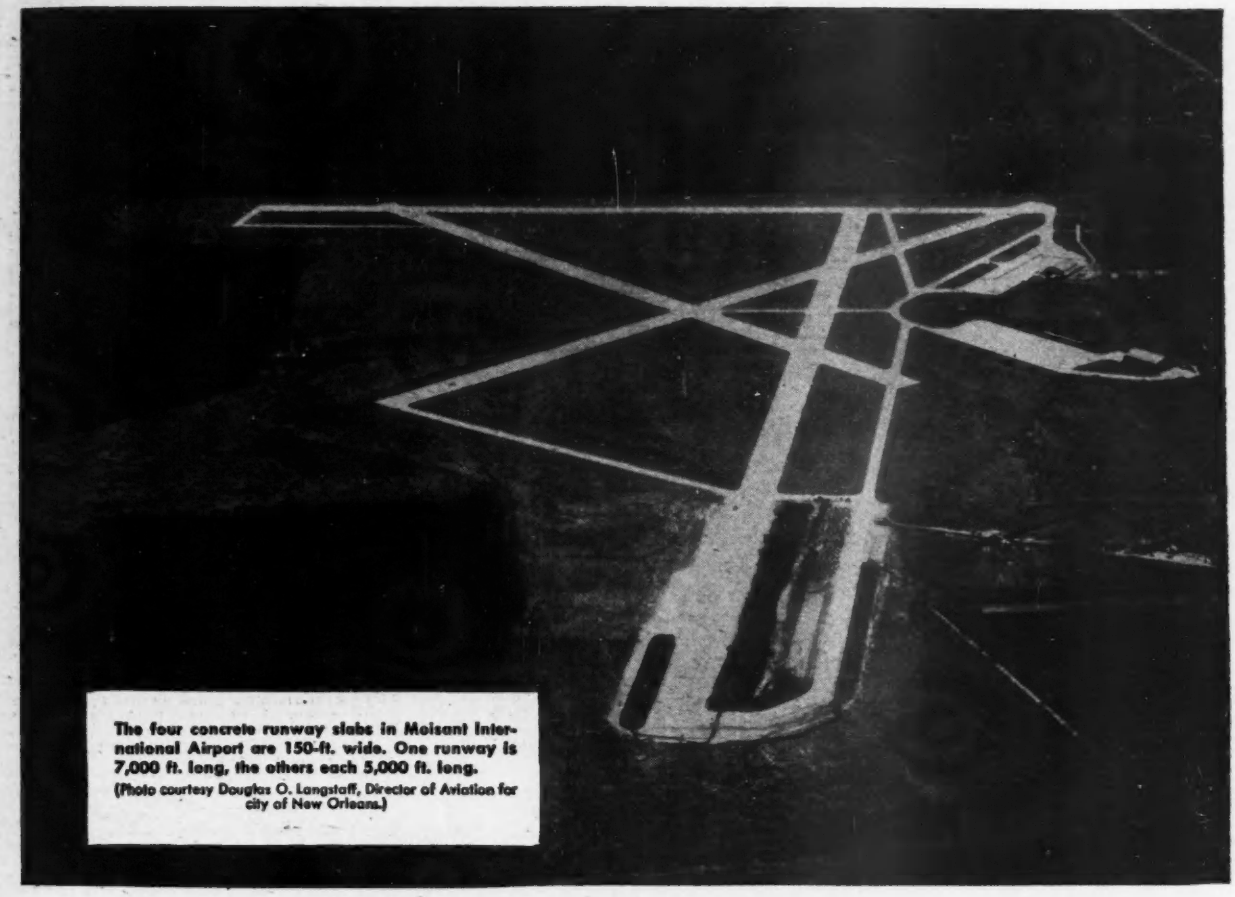
Conn., Middletown—Southern New England Telephone Co., 227 Church St., New Haven, plans by Robert W. Foote, 157 Church St., New Haven, 3 story, 75x130 ft., brick, steel, rein-con., limestone telephone exchange bldg. College and Broad Sts. **$450,000.** Financing provided. CD 6/10.

D. C., Wash.—St. Luke's Methodist Church, c/o Dr. R. D. Smith, 100 Maryland Ave. N.E., plans by Wenner & Fink, 1701 Arch St., Phila., Pa., church, Sunday School. Over **$205,000.** Financing provided.

★**Fla., Jacksonville**—E. E. Anders Realty Co., Atlantic Blvd., plans by B. W. Close, 3954 Cordova Ave., and L. Sheftall, 312 Clark Bldg., 100 houses, Southside Estates. **$600,000.**

Fla., Jacksonville—E. E. Andrews, 1107 E. Adams St., plans completed by B. W. Close, 7 Laura St., and L. Sheftall, Clark Bldg., 66 family housing on Southside Estates for World War 2 Veterans. Approx. **$462,000.** Financing provided. CD 12/20/45—ENR 1/10/46.





The four concrete runway slabs in Moisant International Airport are 150-ft. wide. One runway is 7,000 ft. long, the others each 5,000 ft. long.
(Photo courtesy Douglas O. Langstaff, Director of Aviation for city of New Orleans.)

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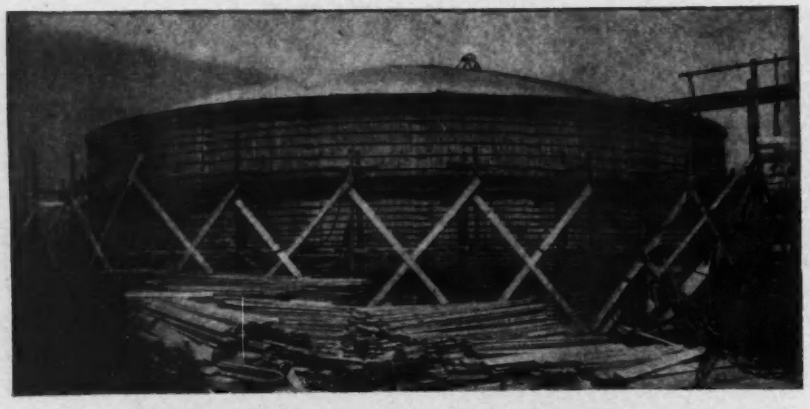

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COMMERCIAL BLDGS. (Proposed Work, Cont'd.)

Fla., Jacksonville—Miller Electric Co., 247 Riverside Ave., store and office. **$400,000.** Financing provided.

★**Fla., Miami**—Evans Motor Co., R. S. Evans, pres., 241 Spring St. N.W., motor and housing display mart. **$1,000,000.**

★**Ga., Columbus**—Nazerene Church, c/o Rev. B. Hall, 1000 31 St., plans by T. Firth Lockwood, Murrah Bldg., brick, concrete, steel Bush Hospital addn. **$500,000.**

Ill., Blue Island—Sisters of St. Mary, c/o St. Frances Hospital, 12948 Gregory St., plans by L. A. Siberts, 103 W. Mifflin St., Madison, Wis., 2 story, brick, concrete, steel hospital addn. **$300,000.**

★**Ill., Centralia**—Illinois Assn. of Southern Baptists, Carbondale, 150 bed hospital. **$600,000.**

Ill., Carmi—Illinois Assn. of Southern Baptists, Carbondale, 50 bed hospital, **$250,000.**

★**Ill., Chicago**—Community Development Trust, H. Holsman, pres., 450 E. Ohio St., preliminary plans by Holsman, Holsman & Klekamp, 450 E. Ohio St., eleven 3 story, brick apartment bldgs. **$1,230,000.**

Ill., Chicago—Prudential Life Insurance Co., Mr. Hulmes, branch mgr., 105 W. Adams St., 2 story, brick, row houses, and 1,400 unit separate homes.

Ill., Chicago—St. Lukes Evangelical Lutheran Church, Greenview and Belmont Sts., plans by W. F. Kramer, 624 Clarence Ave., Oak Park, remodeling church and parish house. **$200,000.**

Ill., Chicago—St. Peter's Evangelical Church, 2250 W. Cortex St., plans by H. C. Haeuser, 759 N. Milwaukee Ave., Milwaukee, Wis., 2 story, brick, stone church. **$200,000.**

Ill., Decatur—Jesuit Society Missouri Province Institute, 4511 W. Pine Blvd., St. Louis, Mo., remodeling recently purchased Pythian Children's Home and landscaping, tract bordered by McKinley Ave., Union and Monroe Sts. **$250,000.**

★**Ill., Rockford**—St. Anthony Hospital, 1401 E. State St., plans completed, laboratory and crippled children's clinic, etc. **$750,000.** Financing provided.

La., Alexandria—Southern Bus Lines, Inc., Ardis Bldg., Shreveport, plans by Barron & Heinberg, Alexandria, 3 story, 96x106 ft., brick, rein.-con. office bldg., air conditioned.

Mass., Salem—William Filene Sons Co., 426 Washington St., Boston, plans by J. E. Holman, 30 Franklin St., Boston, brick, steel, concrete dpt. store, Norman St. **$275,000.** Financing provided.

Mich., Ann Arbor—Michigan Bell Telephone Co., 1365 Cass Ave., Detroit, plans 50% completed by Smith, Hinchman & Grylls, 800 Marquette Bldg., Detroit 2, story, bsmnt., brick, steel, rein.-con. telephone office and exchange. **$200,000.**

★**Mo., St. Louis**—Luther Hospital, c/o Lutheran Charities Assn. Rev. E. C. Hoflus, supt., Lutheran Hospital, 2646 Potomac St., Zone 18, plans by W. B. Ittner, Inc., Bd. Educ. Bldg., 911 Locust St., Zone 1, brick, concrete, stone, 75 to 300 bed hospital addn. **$1,000,000.**

N. J., Atlantic City—Children's Seashore House, Annapolis and Atlantic Aves., plans by S. Martin, 1700 Walnut St., Phila., Pa., children's home. Over **$205,000.** Financing provided.

N. J., Haddonfield—Savar Amusement Corp., 4605 Westfield Ave., Pennsauken, plans by W. H. Lee, Commercial Trust Bldg., Phila., Pa., theatre. Over **$205,000.** Financing provided.

N. Y., Bayside—Premier Developing Corp. c/o Alwin Cassens, Jr., archt., 92-32 Union Hall St., Jamaica, thirty 2 story, 1-family dwellings, 205 St. 56 and 58 Aves. **$270,000.** Financing provided.

N. Y., Brooklyn—Liberty Constr. Co., Inc., R. Deverman, pres., 303 W. 42 St., New York, Zone 18, plans completed by S. L. Malkind, 184 Joralemon St., Brooklyn, 19 homes, Hendericksen St. and Avenue R. **$218,500.** Financing provided.

N. Y., Brooklyn—J. Match, c/o Seelig & Finklestein, archts., 153 Pierrepont St., twenty 2 family dwellings, 2430 to 2486 E. 7 St., **$210,000.** Financing provided.

N. Y., Brooklyn—Parkwood Constr. Co., c/o Seelig & Finkelstein, archts., 153 Pierrepont St., Zone 2, plans completed, thirty 2 family dwellings, 4501-23 Avenue H, and 4502 to 4524 Glendale Court. **$345,000.** Financing provided.

N. Y., Brooklyn—Seagate Manor, Inc., c/o O. I. Silverstone, archt., 153 Pierrepont St., Zone 2, twenty-seven 2 family dwellings, 3701-08 Neptune Ave., 3703-20 Lyme Ave., 3702-18 Maple Ave., and 3702-19 Cypress Ave. **$405,000.** Financing provided.

N. Y., Elmhurst—Vina Del Mar Homes, c/o H. Tannenbaum, 415 Lexington Ave., New York, Zone 17, plans completed eighteen 2 family homes, 65 Pl., 48 and 50 Aves. **$252,000.** Financing provided.

N. Y., Flushing—Domestic Homes, Inc., c/o A. Cassens, Jr., 92-32 Union Hall St., Jamaica, thirty-eight 1 family homes, 174 St., 68 and Jewell Aves. **$306,000.** Financing provided.

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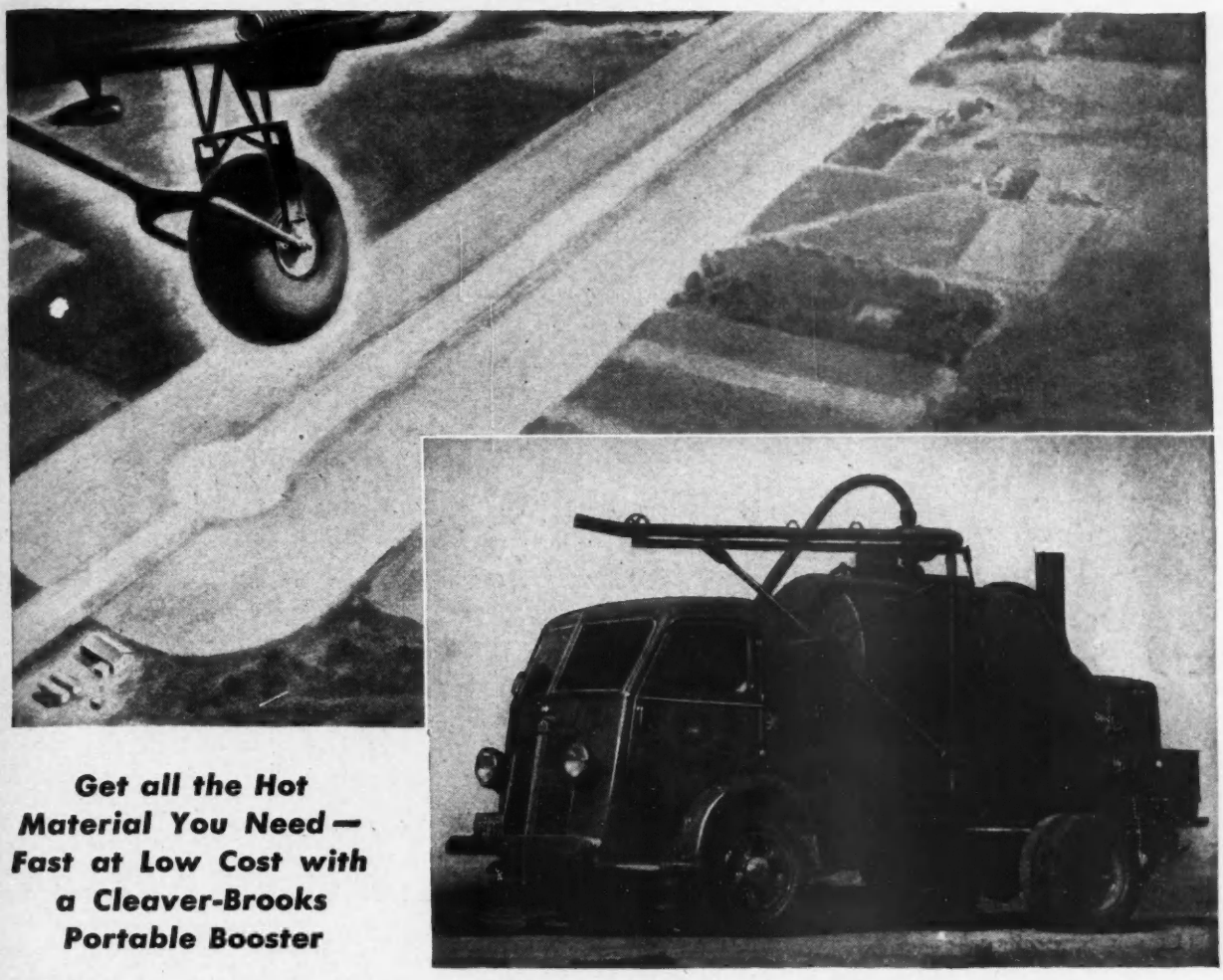

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FIR-TEX INSULATING BOARD CO.

Porter Building, Portland 4, Oregon

COMMERCIAL BLDGS. (Proposed Work, Cont'd.)

N. Y., Flushing—Morton Pickman & S. Berley, 116-09 Queens Blvd., Forest Hills, plans completed by J. Schafran, c/o owner, forty-one 1 family dwellings, 61 Rd. and W. 133 Sts., **$287,000.** Financing provided.

N. Y., Flushing—Sconat Realty Corp., c/o G. G. Miller, archt., 67 W. 44 St., New York, Zone 18, forty-one 1 family dwellings, 197 St., 67 and 69 Aves., **$369,000.** Financing provided.

★**N. Y., Hempstead**—Barnum Ave. Realty Corp., K. Klein, pres., 81-03 Haddon Rd., Jamaica, five hundred fifty 1 family dwellings on 80 acre tract, Barnum Ave. between Front and Prospect Sts. **$5,000,000.**

N. Y., Idlewild—Gifford Assoc., c/o J. S. Rapson, archt., 141-242 253 St., Laurelton, twenty-six 1 family dwellings, 147 Ave. and Huxley St. **$205,000.** Financing provided.

N. Y., Jackson Heights—Manor Gardens, Inc., c/o M. Perlstein, archt., 67-35 75 St., Middle Village, plans completed twenty-five 2 family dwellings, 86 St., 21 Ave. and Ditmars Blvd. **$250,000.** Financing provided.

N. Y., Jamaica—Veterans Co-operative Housing Assoc. of Jamaica, c/o Jewish War Veterans, Jamaica Post 90, 159-15 Hillside Ave., 6 story apartment containing 50 apartments. **$205,000.**

★**N. Y., New York**—43 Park Ave. Corp., c/o George Fred Pehlam, II, archt., 51 E. 42 St., Zone 17, plans completed, 19 story apartment, 43 Park Ave. **$800,000.** Financing provided.

N. Y., New York—Marco, Inc., c/o Henry George Greene, 16 E. 41 St., Zone 17, plans completed, business bldg. alterations, 220-222 W. 20 St. **$205,000.** Financing provided.

★**N. Y., New York**—New York Telephone Co., 140 West St., Zone 7, plans completed by Voorhees, Walker, Foley & Smith, 101 Park Ave., Zone 17, 9 story addn. to 4 story telephone exchange bldg., 228-39 E. 56 St. **$1,500,000.** Financing provided.

N. Y., New York—118 E. 66 St. Corp., 40 E. 49 St., plans completed by G. P. Butler, Jr., 40 E. 49 St., Zone 17, 10 story, apartment, 118-20 E. 66 St. **$350,000.** Financing provided.

★**N. Y., New York**—136 E. 55 St., Inc., c/o Emery Roth & Sons, archts., 18 E. 48 St., Zone 17, plans completed 14 story apartment, 643 Lexington Ave. **$1,600,000.** Financing provided.

N. Y., New York—Roman Catholic Church of St. Philip Neri, 3025 Grand Concourse, Zone 58, plans completed by Starrett & Van Vleck, 267 Fifth Ave., Zone 16, 3 story school, Grand Concourse near Bedford Park Blvd. **$450,000.** Financing provided.

N. Y., New York—Stuyvesant Realty Corp., c/o J. J. McNamara, 51 E. 42 St., Zone 17, plans completed motion picture theatre, shops and offices, 219 Ave. A, also 432 E. 14 and 435 E. 13 St. **$210,000.** Financing provided.

N. Y., Queens Village—Murdock Homes, Inc., c/o Alwin Cassens, Jr., archt., 92-32 Union Hall St., Jamaica, twenty-three 2 story, 2 family dwellings 197 St. and Murdock Ave. **$207,000.** Financing provided.

N. C., Raleigh—Boylan-Pearce, Inc., c/o Dallas Holoman, pres., 216 Fayetteville St., department store, Hillsober, Dawson and Morgan Sts. To exceed **$225,000.**

O., Bexley—Capital University, Bexley, 4 story science bldg. **$300,000.**

O., Cleveland—Cleveland Electric Illuminating Co., E. Lindseth, pres., 75 Public Sq., plans completed office expan. **$296,000.** Financing provided.

O., Cleveland—St. Paul's Episcopal Church, Rev. T. H. Evans, Fairmount Blvd. and Coventry Rd., plans by J. Byers Hayes, Hanna Bldg., 1 story, 60x120 ft. Indiana limestone, steel church addn., with tower, **$400,000.** Financing not provided.

O., Cleveland—Western Reserve University, Euclid Ave. at Acalbert Rd., plans by Garfield, Harris, Robinson & Schaefer, National City Bank Bldg., brick, stone law library addn. **$225,000.**

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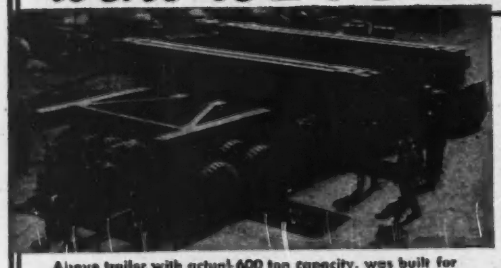

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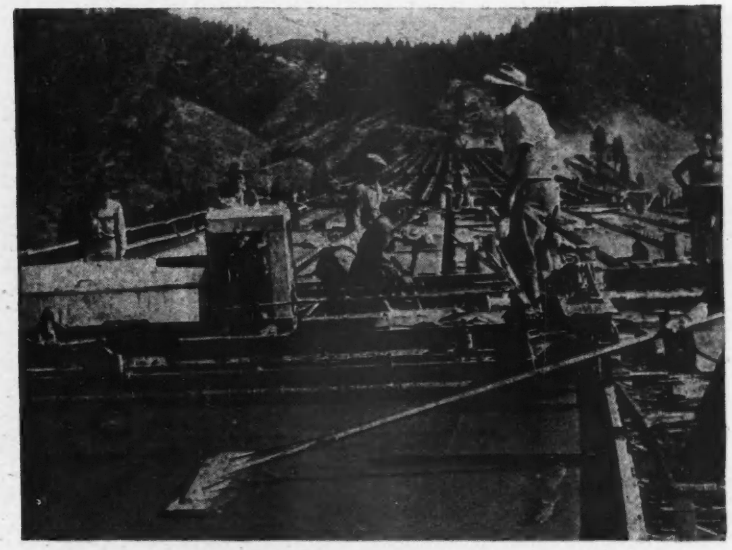

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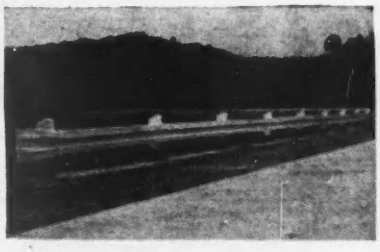
For equipment such as shovels, dragline excavators, ditchers, cranes, etc., you can't buy a tougher or stronger rope than Bethlehem's Purple Strand, made of Improved Plow Steel. And where conditions warrant—as they often will—buy it preformed (Form-Set is our name for it) so that it's less apt to kink or loop, won't bristle, and stands bending fatigue better, thus lasting longer.

RUGGED DRILL STEEL

If you need drill steel, for jobs like making shot holes, buy Bethlehem Hollow Drill Steel, rolled from steel with the toughness and hardening characteristics that this type of work requires. It's suitable for both forged-on bits and for fabricated rods with detachable bits. Bethlehem also supplies Solid Drill Steel for blacksmithing purposes, such as pinch bars, moil points, chisels.



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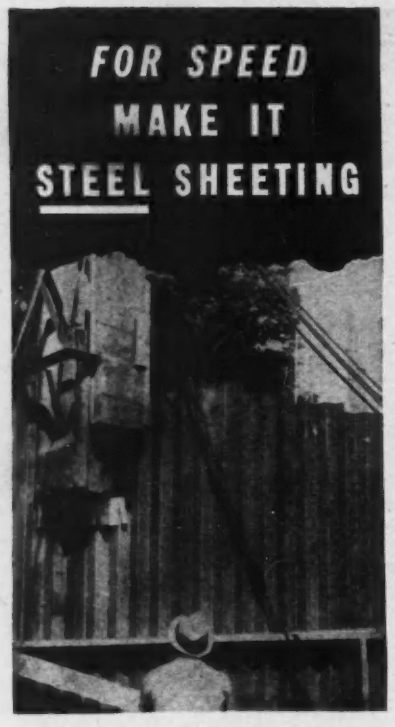

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COMMERCIAL BLDGS. (Proposed Work, Cont'd.)

Ore., Portland—Laco Corp., 6345 N.E. 31 St., 44 unit apartment. **$450,000.** Financing provided, plans incomplete.

Pa., Overbrook (Phila. P. O.)—Episcopal Academy, City Line and Berwick Rd., Lower School addn., over **$205,000**; field house, over **$205,000.** Financing not provided.

★**Pa., Phila.**—Germantown Academy, School Lane & Greene St., plans by G. Edwin Brumbaugh, Gwynedd Valley, school, **$250,000**; gymnasium, **$250,000.** Financing not provided.

Pa., Phila.—The Howard Clothes, Inc., 170 Tilry St., Brooklyn, N. Y., plans by Horace Ginsbern & Assoc., 205 E. 42 St., New York, N. Y., and N. N. Rice, 2220 Chestnut St., extensive bldg. alterations. Over **$205,000.** Financing provided.

Pa., Phila.—Jewish Shelter Home for Homeless & Aged, 315 S. 3 St., plans by I. Demchick, 246 S. 15 St., home. Over **$205,000.** Financing provided.

Pa., Phila.—Ledon Realty Co., c/o H. F. Diener & Co., commercial bldg., Broad and Wingohocking Sts. **$400,000.** Financing provided.

★**Pa., Phila.**—Walton Hotel Corp., C. Pitman Baker, Jr., mgr., Broad and Locust Sts., hotel reconstruction, addns., alterations. Over **$500,000.**

R. I., Providence—Penn Realty Co., 295 Atwells Ave., plans by W. C. Mustard, 60 Barnes St., 1 story, 300x450 ft., brick, concrete business bldg., incl. theatre, stores, bowling alleys, and super market, and a parking area, Smith St. Over **$205,000.**

★**Tenn., Chattanooga**—Baroness Erlanger Hospital, 186 bed hospital addn. **$1,200,000.** CD 12/3—ENR 1/3, under Public Bldgs.

★**Tenn., Nashville** — Vanderbilt University, Nashville, plans by Ed. A. Keeble, Cotton States Bldg., memorial gymnasium, swimming pool. **$2,000,000.**

★**Tex., Austin**—Western Reserve Life Insurance Co., 1108 Lavaca St., 10 story, bsmnt., brick or stone, rein.-con., steel office and 3 story ramp parking garage. **$1,000,000.** Financing provided.

★**Tex., Beaumont**—H. Gilbert & Associates, plans by Cass Gilbert, Jr., Beaumont, 1000 room hotel. **$7,500,000.** Financing not provided.

★**Tex., Dallas**—Dallas Academy of Medicine, Med. Arts Bldg., plans Academy of Medicine bldg. **$500,000.** Financing not provided.

★**Tex., Dallas**—I. & L. Development Co., c/o T. L. Gay, Cedar Springs Rd., 11 apartment bldgs., North of Inwood and west of Denton Rd. **$1,200,000.** Financing provided.

Tex., Dallas—Kirby Bldg., Main and Akard Sts., plans by T. Jameson & Merrill, remodeling office bldg., incl. air-conditioning. **$210,000.** Financing provided.

Tex., Dallas—A. Pollard Simons, 1917 Ross Ave., plans completed by L. O'Bannon, 2610 Fairmont St., remodeling 2 story bldg. and adding 3 addnl. stories, brick, steel, rein-con., etc. **$300,000.** Financing provided.

★**Tex., Duncanville**—Crown Constr. Co., c/o R. L. & Clark Pelt, 2215 Lawndale, Dallas, 300 dwellings south of Cockrell Hill, 50 dwellings, paving streets, sanitary sewers. **$1,635,000.** Financing provided.

★**Tex., Duncanville**—T. Pinson and R. Merritt, Irwin-Keasler Bldg., Dallas, 400 dwellings, paving streets, site and grounds development, c.i. water lines and facilities, sanitary sewers. **$1,925,000.**

Tex., Fort Worth—Kaufman Constr. Co., 2215 Edwin St. plans by M. M. Moseley, 2215 Edwin St., residences. **$225,000.** Financing provided.

Tex., Fort Worth—D. W. Quinn Constr. Co., 821 Currie St., plans 90% completed 51 frame dwellings. **$231,000.** Financing provided.

★**Tex., Fort Worth** — Trinity Bldg. Corp., Cleburne Rd., plans completed by E. Bedford Jones, 2626 Alameda Bldg., Dallas, one hundred sixty-two 1 story residences, rein-con. fdns. **$978,000.** Financing provided.

Tex., Houston—L. B. Bales, Lamar Hotel Annex, 22 dwellings, Southland Terrace zone. **$210,000.** Financing provided.

★**Tex., Houston**—J. N. Jordy, Esperson Bldg., commercial bldg. **$1,500,000.** Financing provided.

Tex., Houston—S. H. Kress & Co., Kress Bldg., plans 90% completed by E. F. Sibbert 444 Fifth Ave., New York, commercial bldg., Harrisburg Blvd. **$205,000.** Financing provided.

Tex., Houston—Northside Presbyterian Church, 3600 Blk. Fulton St., plans by H. D. Payne, 3908 Main St., 2 story educational and Sanctuary bldg. **$210,000.** Financing provided.

★**Tex., Houston**—Optimists Clubs, Southern Standard Bldg., plans by H. A. Stubee, 3908 Main St., constructing Boys Town Home. **$1,000,000.** Financing not provided.

★**Tex., Houston**—Southwestern Properties, R. W. Peckham, pres., 2141 Westheimer St., plans under way 142 dwellings, at Peckham Place; rein.-con. curbing and gutters, c.i. water lines, facilities, sahitary sewer lines. **$1,930,000.** Financing provided.

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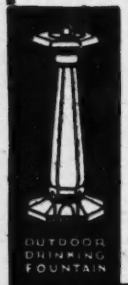

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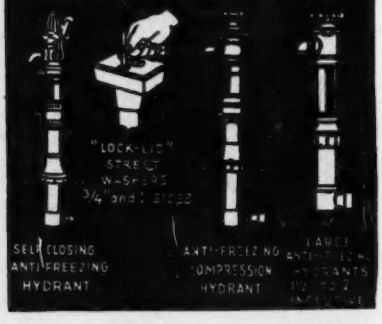

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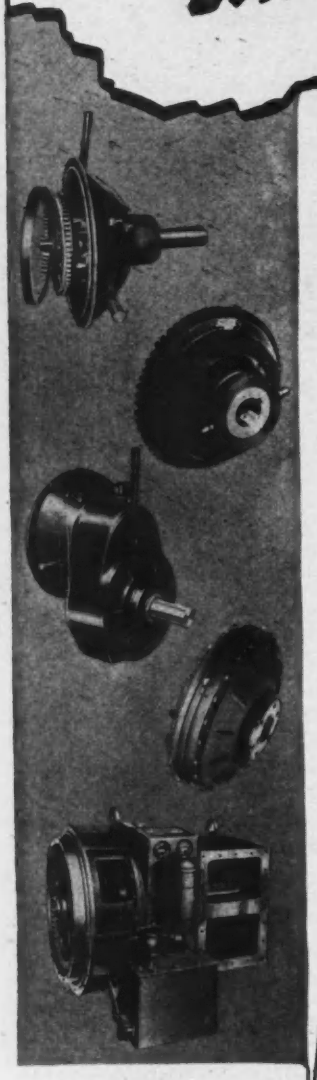

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SPECIALISTS IN INDUSTRIAL CLUTCHES SINCE 1918

COMMERCIAL BLDGS. (Proposed Work, Cont'd.)

Tex., Houston—Southwest Greyhound Lines, Inc., 713 Milam St., plans by G. Gill, Great Nat'l Life Bldg., Dallas, bus terminal bldg. **$450,000.** Financing provided.

★**Tex., Pasadena**—R. E. & C. Hankamer & Associates, Commerce Bldg., Houston, 400 dwellings, sanitary sewers, street construction and paving, c.i. waterlines and facilities, site development, grading, and drainage. **$2,675,000.** Financing provided.

Tex., San Antonio—Jefferson Methodist Church, c/o Methodist Mission Bd., P. I. Nixon, Medical Arts Bldg., plans 25% completed by H. Steinbomer, Travis Bldg., church. **$300,000.** Financing not provided.

★**Tex., San Antonio**—Texas National Hotel Assn., c/o A. S. Fraser, consult. engr. and archt., 622 American National Bank Bldg., Galveston, plans completed 10 story, bsmnt., 147x148 ft. rein.-con. brick, limestone hotel addn. **$750,000.** Financing provided.

Va., Richmond — St. Giles Presbyterian Church. Dr. J. Blanton Belk, 401 Tuckahoe Blvd., plans by L. W. Ballou, 1103 E. Main St., church, auditorium and chapel. **$300,000.** Financing provided.

★**Wash., Seattle**—Metropolitan Building Co., Cobb Bldg., 4 and University Sts., Zone 4, medical and dental bldg. addn. **$1,000,000.**

Wash., Spokane—W. Edris, White-Henry-Stuart Bldg., 4 and Union Sts., Seattle, Zone 1, plans by Funk, Molander & Johnson, Sun Life Assurance Bldg., 10 story addn. to Davenport Hotel. **$350,000.** Financing provided. CD 5/29—ENR 6/6.

Wash., Vancouver — Hamrick-Evergreen Theaters, Skinner Bldg., 5 and Union Sts., Seattle, Zone 1, plans by B. M. Priteca, Palomar Bldg., 3 and University Sts., Seattle, Zone 1, theater. **$350,000.** Financing provided.

Wash., Vancouver—Lackamas Corp., c/o D. J. Stewart, archt., 222 Central Bldg., 54 houses. **$432,000.**

Alta., Lamont—United Church Hospital Bd., Lamont, wings to hospital. **$210,000.**

B. C., Vancouver—Canadian National Institute for Blind, 1101 W. Broadway, workshop and facilities bldg. **$165,000.** CD 10/4—ENR 10/18.

★**N. B., Dalhousie**—Reverend Sisters of Saint John, Adelaide St., hospital. **$500,000.**

Ont., Chatham—Canada & Dominion Sugar, Ltd., Chatham, dwellings for employees. **$225,000.**

Ont., Eastview—M. Vachow, Britannia Bay, plans by W. C. Sylvester, 46 Elgin St., Ottawa, 3 apartment blocks, 15 apartments, Mona St. **$225,000.**

Ont., Kirkland Lake—K. L. Postwar Housing Com., Kirkland Lake, 100 dwellings. **$475,000.**

Ont., Oakville—Housing Enterprises of Canada, Ltd., D. H. Storms, genl. mgr., 395 Fleet St., Toronto, 50 houses. **$250,000.**

★**Ont., Toronto**—Canadian Oil Co., Ltd., Terminal Warehouse Bldg., office bldg., Queen W. and University Ave. **$750,000.**

★**Ont., Windsor**—Assumption College, 398 Huron Line, Sandwich, plans by J. C. Pennington, Bank of Commerce Bldg., 3 story, bsmnt., brick, concrete science bldg. **$750,000.** CD 5/8—ENR 5/23.

Que., Chicoutimi—Les Soeurs Missionaires De L'Immaculle Conception, 61 Jacques Cartier St., convent. **$250,000.**

★**Que., Mount Royal (Postal Dist. Montreal)**—Housing Enterprises (Montreal), Ltd., Sun Life Bldg., Montreal, 150 houses. **$750,000.**

★**Que., Mount Royal (Postal Dist. Montreal)**—Town Planned Sites, Ltd., 100 dwellings. **$600,000.**

Que., St. Audre—Reverend Sisters of Good Shepherds, St. Audre, convent. **$300,000.**

Sask., Regina—Lasserre Community Co-Operative Assn., c/o city clerk, housing, nurseries, garages and laundry. **$275,000.**

INDUSTRIAL BUILDINGS

PROPOSED WORK

Ala., Bemiston — WAREHOUSE — Bemis Bros. Bag Co., 408 Pine St., St. Louis, Mo., plans by Greer, Holmquist & Chambers, Chamber of Commerce Bldg., Birmingham, 100x400 ft., concrete, steel cotton warehouse. **$125,000.**

Calif., Berkeley — FACTORY — Pacific Paint & Varnish Co., 4 and Cedar Sts., plans by Ellison & King, 500 Sansome St., San Francisco, 2 story, 60x100 ft., rein.-con. factory. **$120,000.**

Calif., Los Angeles — FACTORY — Mission Appliance Co., 7101 McKinley Ave., plans 25% completed by Taylor & Barnes, 803 W. 3 St., 1 story, 150x800 ft., steel, frame factory, Crenshaw Blvd. and Santa Barbara St. **$425,000.**

Calif., Los Angeles—FACTORY—National Automotive Fibres, Inc., 6001 E. Randolph St., plans completed, concrete, multiple quonset type factory bldgs., sprinkler sys. **$203,500.** Financing provided.

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INDUSTRIAL BLDGS. (Proposed Work, Cont'd.)

Calif., Los Angeles—FACTORY—Radio Corp. of America, 1016 N. Sycamore St., plans completed 2 story, 40x130 ft., rein.-con. factory. **$146,300.** Financing provided

Calif., Los Angeles — FACTORY —S. K. Smith Co., 421 S. Brand St., Glendale, plans completed by C. J. Small, 144 S. Orlando Ave., 1 story, rein.-con. factory, 4400 Sunset Blvd. **$150,000.** Financing provided.

Calif., Maywood—FOUNDRY, etc. — H. Kramer & Co., 2460 Enterprise St., Los Angeles, plans completed 50x200 ft. foundry, 75x200 ft. warehouse, 50x125 ft. office, rein.-con., steel 52 Pl. **$125,000.** Financing provided.

★**Calif., Plaster City** — FACTORY — U. S. Gypsum Co., 816 W. 5 St., Los Angeles, plans completed group 5 small and 1 large steel, frame corrugated iron, wallboard factory bldgs. **$2,500,000.**

Calif., Sacramento—WAREHOUSE—Pacific Coast Aggregates, c/o Mr. Piper, 16 and A Sts., plans under way warehouse. **$100,000.**

Calif., Santa Clara—WAREHOUSE—Storitcold, 1300 Webster St., Oakland, refrigerated warehouse, **$300,000.**

Conn., Danbury — FACTORY — Bieber-Goodman Corp., E. Liberty St., plans completed by LaGava & Campbell, 248 Main St., 2 story, 50x175 ft., brick, steel, concrete forming and blowing dpt., factory, E. Liberty St. **$100,000.** Financing provided.

Conn., Norwalk — FACTORY — Hat Corp. of America, G. Rickus, vice pres., 1 story, brick, steel, concrete factory addn., East Section. **$350,000.** Financing provided. Westcot & Mapee, Inc., 109 Church St., New Haven, consult. engrs.

Conn., Orange—TRUCK-FREIGHT TERMINAL—Associated Transport, Inc., 325 Memorial Ave., West Springfield, plans completed by Albert J. Carson, 325 Memorial Ave., West Springfield, 1 and 2 story, brick, steel truck-freight terminal. **$175,000.** Financing provided.

★**Fla., Cantonemene** — PLANT — Florida Pulp & Paper Co., Cantonemene, plans completed, expanding, imprv. plant. **$627,200.** Financing provided.

Fla., Fort Meade — MINE — Swift & Co., Fort Meade, phosphate mine. **$280,000.** Financing provided.

Fla., Jacksonville — PRINTING PLANT — Florida Publishing Co., Jacksonville, plans completed by Marsh & Saxelby, Hilderbrandt Bldg., Zone 2, printing and publishing bldg. **$160,000.** Financing provided.

Fla., Jacksonville—PLANT—Midstates Steel & Wire Co., Crawfordsville, Ind., plans completed, galvanized wire, nails, steel products mfg. plant, on property adjoining St. Johns River Shipbuilding Company's property, **$100,000.** Financing provided.

Fla., Jacksonville — WAREHOUSE, etc. — Winn & Lovett Gro. Co., 1357 W. Beaver St., plans completed by A. C. Hopkins, 409 W. Adams St., altering, expanding storage warehouse and cold storage facilities. **$350,000.** Financing provided.

Fla., Lake Alfred—PLANT—Florida Gold Citrus Corp., Lake Alfred, citrus processing plant. **$175,000.**

Fla., Tampa — STORAGE — Kraft Foods Co., N. Boulevard and Cass St., food storage. **$160,000.** Financing provided.

Fla., Tampa — PLANT — Lee Co., Hillsborough Ave., citrus process and by-products plant. **$230,000.** Financing provided.

★**Ga., Atlanta**—PLANT—Southern United Co., c/o J. H. Gordon, pres., 309 W. South St., Jackson, Miss., concrete, brick, steel cold storage plant. **$1,200,000.** Financing provided.

Ill., Alton—PLANT—Owens Illinois Glass Co., Alton, brick, concrete, steel engineer's shop, mold shop, machine parts mfg. dpt., Broadway and Illinois Ave. Over **$100,000.**

Ind., Wabash — PLANT — Eagle Pitcher Lead Co., Wabash, plant addns. **$400,000.**

La., New Orleans — WAREHOUSE —Walgreen Drug Co., 744 E. Bowen Ave., Chicago, Ill., warehouse and distributing branch, Bienville and S. Scott Sts. **$250,000.**

Mass., Attleboro—FACTORY—Bay State Optical Co., 46 Pine St., plans by Henry McClean & Son, 44 Franklin St., Providence, R. I., 1 story, 60x500 ft., 2nd story 25x160 ft., brick, concrete factory, **$190,000.** Financing provided.

Mass., Cambridge — PLANT — J. Reardon, 51 Waverly St., altering rendering and soap plant, blacksmith shop and drum storage units, rebuilding steamout bldg., miscellaneous changes, Waverly St. **$115,000.** Financing provided.

Mass., Chicopee Falls — FACTORY — Fisk Division U. S. Rubber Co., 154 Grove St., plans completed, factory imprvs., Grove St. **$82,300.**

Mass., Dorchester — PLANT — Walter Baker & Co., Inc., 1197 Washington St., plans under way brick, steel plant. **$135,000.** Financing provided.

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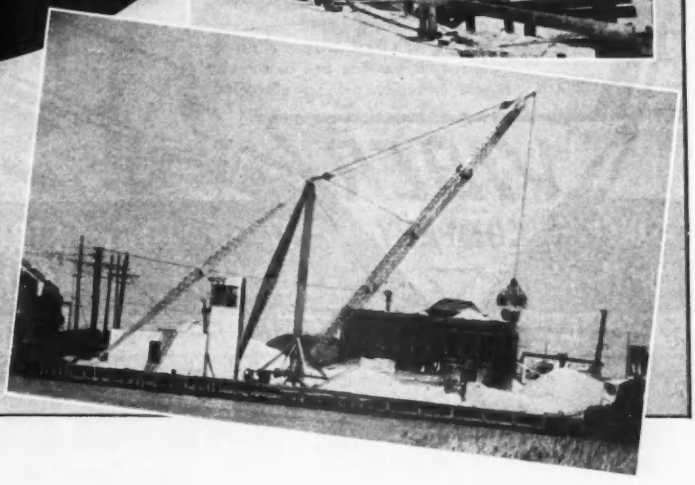

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INDUSTRIAL BLDGS. (Proposed Work, Cont'd.)

Mass., Fall River—SALES AND SERVICE—D. S. Cohen, 101 Bank St., plans by J. M. Darling Jr., 878 South Main St., 1 story auto station, Tenth St. and Pleasant Ave. **$75,000.**

Mass., Framingham—STOREHOUSE—First National Stores, Framingham, rebuilding brick, concrete storehouse addn. **$90,000.** Financing provided.

Mass., Norton — PLANT — Talbot Wool Combing Co., Norton, brick plant, **$125,000.** Financing provided.

Mass., Winchester — PLANT — Beggs & Cobb, Inc., 76 South St., Boston, brick, steel plant addn., Swanton St. **$175,000.** Financing provided.

Mass., Worcester — PLANT — Neponset Fur Storage Co., Worcester, plans under way brick, steel plant. **$100,000.** Financing provided.

★**Mich., Dearborn**—RESEARCH CENTER, etc.—Ford Motor Co., 3000 Schaefer Dr., Dearborn, research and engineering center on 500 acre tract, incl. 8 bldgs., 350x800 ft. lake. **$50,000,000.**

Minn., Minneapolis — BAKERY, etc. — Purity Baking Co., J. S. Tombers, vice pres., 97 12 St., St. Paul, plans by Land & Raugland, 502 Wesley Temple Bldg., 1 story, bamnt., 90x112 ft., rein.-con., brick bakery and distr. warehouse. **$165,000.** CD 12/28—ENR 1/10.

Mo., St. Louis—FACTORY—Gedo Corp., c/o E. V. Svoboda, pres., Lithocraft Studios, Inc., 1531 Washington Ave., Zone 3, 1 story, brick, rein.-con. factory, Kemper Ave. and Hereford St. between Kings Highway and Brannon Ave. **$100,000,** incl. equip.

N. J., Wildwood—BAKERY—Latimers Bakery, Wildwood, rebuilding bakery, **$150,000.**

N. Y., Bliseville — FACTORY — Airdepot Realty Corp., c/o S. Goldsmith, 80 Livingston St., Brooklyn, Zone 2, 1 story factory, Starr Ave. and 21 Place. **$100,000.** Financing provided.

N. Y., Brooklyn — FACTORY — Frostone Corp., A. Stone, pres., 200 Tillary St., plans completed by H. Gretsch, 13 Court St., 3 story 79x150 ft. factory, 202-208 Tillary St. **$100,000.** Financing provided.

★**N. Y., Buffalo** — SUPERMARKET and WAREHOUSE—American Stores Co., W. Park, pres., 424 N. 19 St., Phila., Pa., (Danahy Faxon, T. P. Cauley, pres., Niagara Frontier Food Terminal, Buffalo, subsidiary) 1 story, 400x500 ft., brick, concrete and part 2 story supermarket and warehouse with parking area for 250 to 400 cars on site not announced. Over **$1,000,000.** Ganteaume & McMullen, 99 Chauncy St., Boston, Mass., engrs. and archts.

★**N. Y., Buffalo** — WAREHOUSE, etc. — Danahy-Faxon Stores, Inc., Niagara Front Food Terminal, food warehouse and supermarket, **$1,000,000.**

N. Y., Elmhurst — FACTORY — Pedese Realty Corp, c/o S. Goldsmith, 80 Livingston St., Brooklyn, Zone 2, plans completed 1 story factory, Pequot Rd. near 88 St. **$100,000.** Financing provided.

N. Y., Niagara Falls—FACTORY—The Carborumdum Co., Buffalo Ave., remodeling Bldg. 5 and erecting 4 story, 23x16 ft., brick bldg known as No. 16, south side of Buffalo Ave. between Carborundum and Aluminum Rds. **$209,000.**

N. Y., Rochester—PLANT—Curtice Brothers Co., canning plant. **$250,000.**

O., Painesville—PLANT—Butler Bros. Mining Co., Painesville, electrolytic iron power plant. **$310,000.**

★**O., Painesville**—PLANT—Diamond Alkali Co., Painesville, plant addn. **$2,714,700.**

★**O., Painesville**—PLANT—Glenn L. Martin Co., Painesville, vinyl resin plant. **$585,000.**

O., Rittman—FACTORY—Ohio Boxboard Co., Rittman, factory unit. **$125,000.**

O., Steubenville—FACTORY—Wheeling Steel Corp., Wheeling, W. Va., factory addn. **$101,468.**

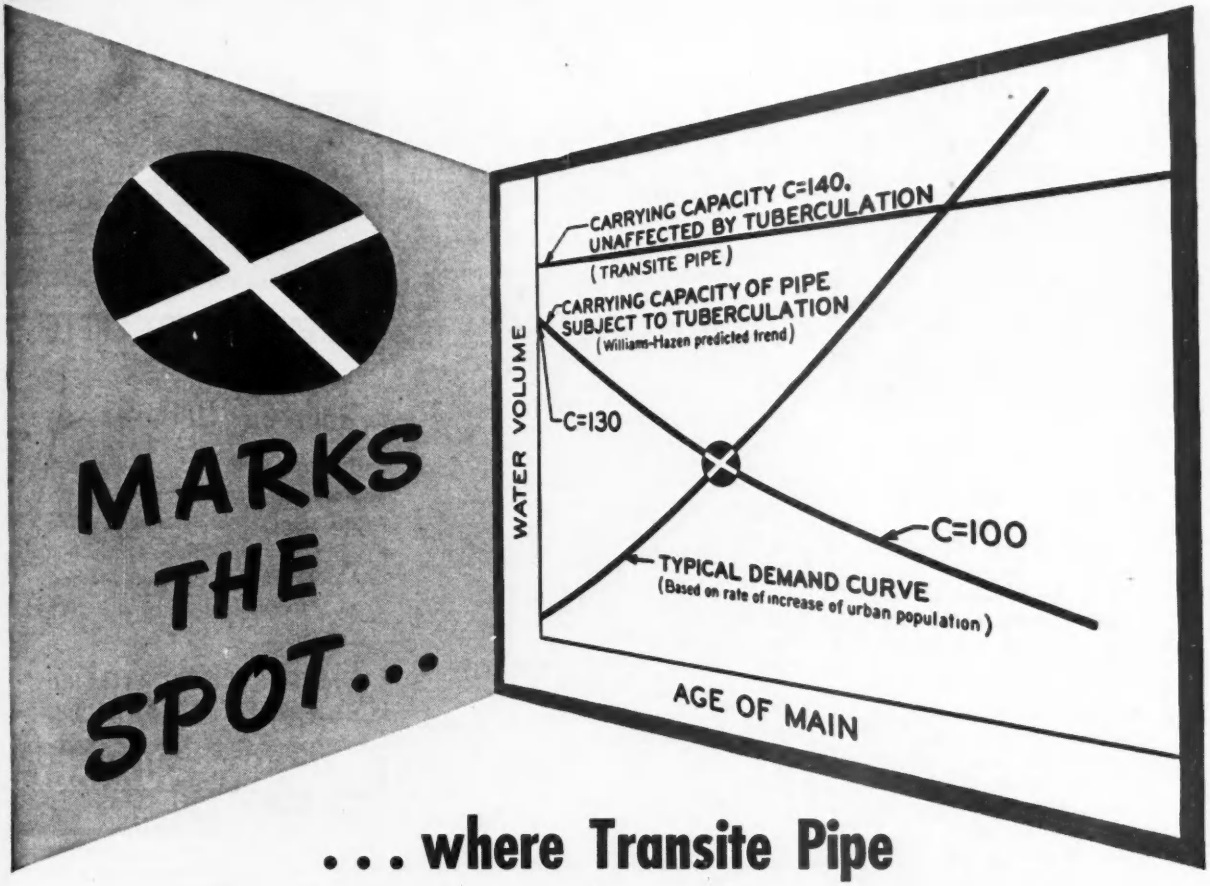
O., Youngstown—PLANT—Ohio Edison Co., 25 E. Boardman St., steam plant expan., raising roof present bldg. 20 ft. and installing 3 boilers, at North Ave. Station. Over **$105,000.**

Ore., Klamath Falls — PLANT — J. D. O'Connor, Klamath Falls, reconstructing feed plant. **$175,000.**

Ore, Portland—FREIGHT TERMINAL—Inland Motor Freight Co., 110 Sheridan St., Spokane, Wash., plans by Annand & Kennedy, Central Bldg., 70x100 ft. freight terminal. **$100,000.** Financing provided.

Ore., Springfield—PLANT—Springfield Sand & Gravel Co., Springfield, rock crushing plant. **$100,000.**

★**Pa., Aliquippa** — COLD ROLLING MILL, etc. — Jones & Laughlin Steel Corp., Pittsburgh, four 1 story, brick, steel, concrete cold rolling mill bldgs., **$1,000,000;** altering ingot mill, incl. rebuilding machine shop, repair runway fdn., and crane pit, relocated coal bin, pump house and miscellaneous alterations. **$76,300.**



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INDUSTRIAL BLDGS. (Proposed Work, Cont'd.)

Pa., Altoona — WAREHOUSE — Wolf Furniture Co., Altoona, plans by Hunter & Caldwell, 5 Ave., 1 story, 120x120 ft., brick, steel, warehouse top addn. **$55,000.**

Pa., Coudersport—MILL—G. L. F. Feed Mill, Coudersport, rebuilt feed mill. Over **$150,000.**

★**Pa., Johnstown**—PLANT—Bethlehem Steel Co., Johnstown, constructing 4 bldgs. at wheel plant, **$511,000.**

Pa., Mahanoy City—INDUSTRIAL—Eagle Bros., Mahoney City, plans under way industrial bldg. **$110,000.** Financing provided.

Pa., Muncy—PLANT—Jones & Laughlin Steel Corp., Third Ave. and Ross St., Pittsburgh, plans under way, plant addn. **$240,000.** Financing provided.

Pa., Phila.—PLANT—Continental Distilling Co., 1429 Walnut St., plans under way industrial bldg. **$125,000.** Financing provided. CD 7/30—ENR 8/2.

★**Pa., Phila.**—PLANT—Dill & Collins, Div. Mead Corp., Richmond and Tioga Sts., paper mfg. plant. **$5,000,000.** Financing provided. G. F. Hardy, 441 Lexington Ave., New York, N. Y., consult. engr.

Pa., Pittsburgh — GARAGE, etc. — Dixon Motor Co., W. Montgomery Ave., 1 story, 180x300 ft., steel, concrete block garage and salesroom, **$100,000.**

Pa., Renovo—SHOPS—The Pennsylvania R. R., J. L. Gressitt, ch. engr., Broad St. Station Bldg., 1617 Pennsylvania Blvd., Phila., Zone 4, shop addns., alterations. **$148,600.** Financing provided.

★**Pa., Royersford**—PLANT—Diamond Glass Co., Royersford, plans under way plant addns., alterations. **$698,000.** Financing provided.

Pa., Scotland—PACKING PLANT—Chambersburg Fruit Co-operative Assoc., Chambersburg, plans under way, packing plant. **$114,000.** Financing provided.

Pa., Sheridan (Schaefferstown P. O.) — PLANT—Penndale Distilling Co., Girard Trust Bldg., Phila., plant, **$175,000.** Financing provided.

★**Pa., Spring Grove**—PLANT—P. H. Glatfelter Co., Spring Grove, power plant exten. **$600,000.** H. M. Wilson Co., 18 and Brandywine Sts., Phila., consult. engrs.

Pa., Tionesta—FACTORY—Purenton Potter Co., Tionesta, plans completed 1 story, 100x308 ft., concrete block, tile factory. **$55,000.** Financing provided.

★**Pa., Wilkes-Barre** — PLANT — Anthony Shoes Inc., 697 Hazle St., plans under way plant. **$500,000.** Financing provided.

Tenn., Nashville — PLANT — General Shoe Corp., 511 Main St., leather sole cutting plant. **$350,000.** Financing provided.

Tex., Corpus Christi—PLANT—H. Starnes, c/o Colley & Christian, archts., 921 Ocean Dr., meat packing plant. **$125,000.** Financing provided.

Tex., Crane—BOOSTER PUMPING STATION—Texas-New Mexico Pipe Line Co., 720 San Jacinto St., Houston, plans under way booster pump. station. **$100,000.** Financing provided.

Tex., Dallas—PLANT—Hutting Sash & Door Co. of Texas, 304 N. Crowdus St., plans completed production plant bldg. **$145,000.** Financing provided.

Tex., Fort Worth — FACTORY — A. Brandt Upholstering Co., Inc. 1701 E. Lancaster St., plans 35% completed factory. **$100,000.** Financing provided.

Tex., Harlingen—PACKING PLANT—Adams Garden Food Products Co., Harlingen, cannery and food products packing plant. **$130,000.** Financing provided.

Tex., Houston—GARAGE—First National Bank in Houston, 201 Main St. auto parking garage. **$225,000.** Financing provided.

Tex., Houston—STORAGE, etc.—Foley Bros., 407 Main St., plans under way storage room for processing furniture, drapes, household appliances, etc. **$450,000.** Financing provided.

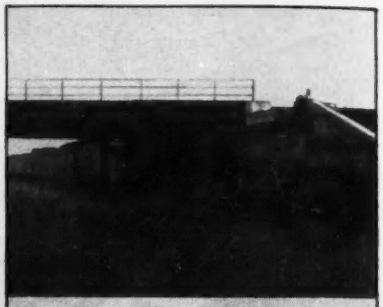
Tex., Houston — GARAGE, etc. — G. H. McCarthy, 5201 Fannin St., plans by Hedrick & Lindsley, consult. engrs. and archts., 5201 Fannin St., steel, brick, hollow tile, concrete garage and repair shop service bldg. **$245,000.** Financing provided.

★**Tex., Houston**—PLANT—Shell Oil Co., Inc., Shell Bldg., plans under way power and boiler plant, in Refinery area, at Deere Park. **$2,600,000.** Financing provided.

Tex., Houston — REPAIR SHOP — Smith Marine Corp., 2nd National Bank Bldg., repair shop, marine machine shop, barge and shipyard on 7 acre site. **$160,000.** Financing provided.

Tex., Houston — WAREHOUSE — Stearns-Roger Mfg. Co., Union National Bank Bldg., warehouse. **$100,000.** Financing provided.

Tex., Houston—ARMORY—Texas National Guard, Austin, plans armory. **$225,000.** Financing not provided.



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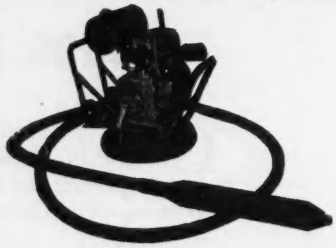

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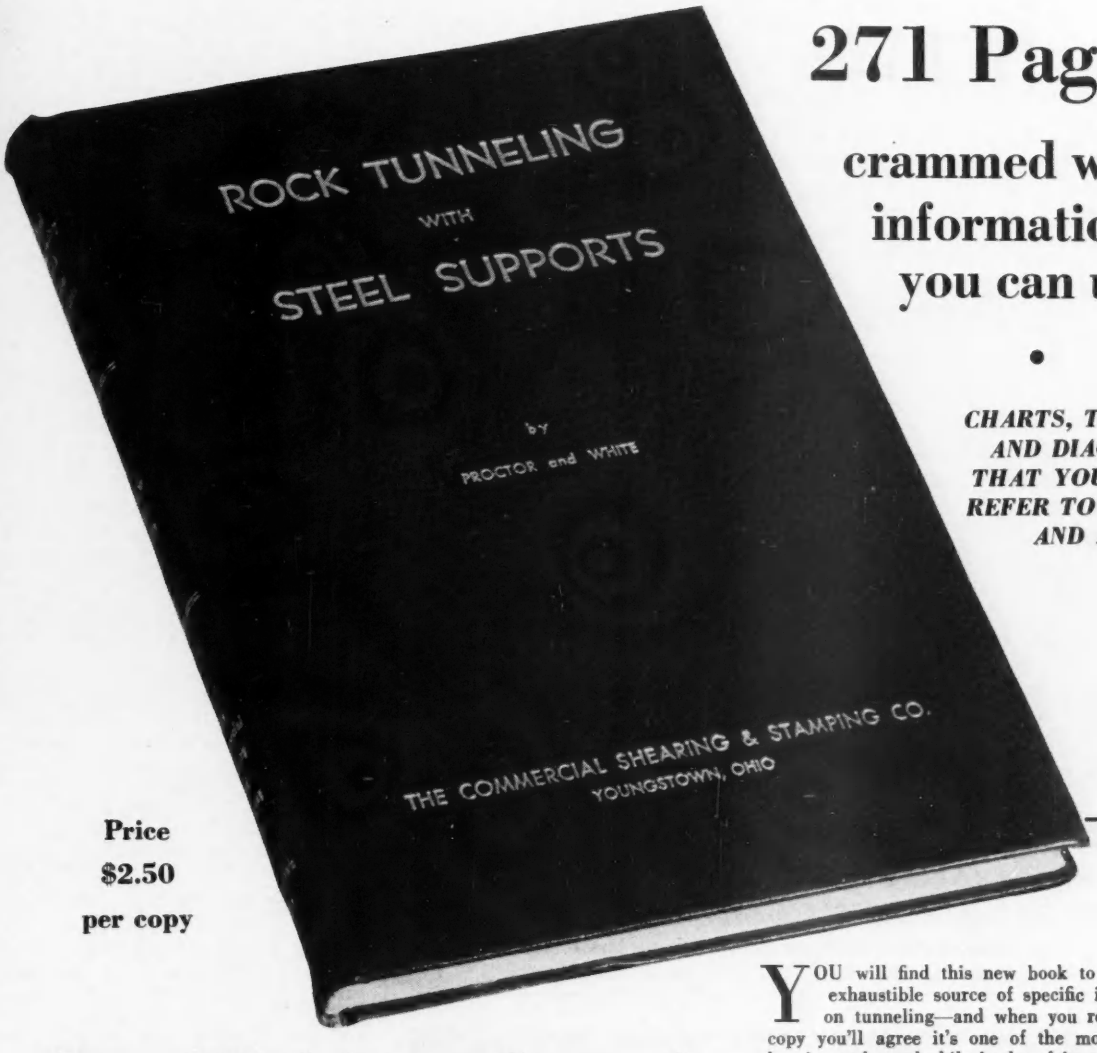

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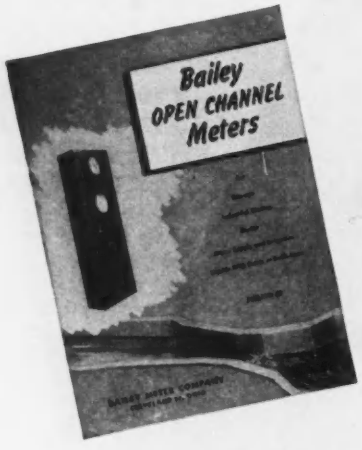

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INDUSTRIAL BLDGS. (Proposed Work, Cont'd.)

Tex., San Antonio—AUTO SALES, REPAIR SHOP, etc.—O. R. Mitchell Motors, 1041 Navarro St., auto sales, repair shop, service, display and parts bldg. **$400,000.** Financing provided.

Tex., San Antonio — TERMINAL, etc. — White & Blue Taxicab Co., Dolorosa Ave., plans 10% completed by **M. Simone, 226 Aztec** Bldg., 7 story concrete, brick terminal, repair shop, body works and auto storage bldg. **$150,000.** Financing provided. CD 1/30—ENR 2/24.

Tex., Sinton—PLANT—Plymouth Oil Co., plans 75% completed combination low pressure gasoline, pressure maintenance, and cycling plant, in Plymouth Field, near here. **$325,000.** Financing provided. Engr. Div. Jones & Laughlin Supply Co., Oil & Gas Bldg., Houston, consult engr.

★**Tex., Texas City**—PLANT—Carbide & Carbon Chemical Corp., Texas City, plans under way plant mfg. ethyleneamines. **$961,-000.** Financing provided. CD 5/13—ENR 5/23.

Wash., Mount Vernon — PLANT — Wash. Co-operative Farmers Assn., 201 Elliott Ave. W., plans by S. Ivarsson, Skinner Bldg., Seattle, Zone 1, 2 story, bsmnt., 120x200 ft., rein.-con. poultry and turkey dressing plant. **$285,000.** Financing provided. CD 5/9—ENR 5/30.

★**Wash., Seattle**—SHEET MILL—Seidelhuber Iron & Bronze Wks., 1421 Dearborn St., Zone 4, 200x1200 ft., steel, rein.-con. steel sheet mill. **$5,000,000.** Financing provided. Engineering Associates, Polson Bldg., Zone 4, consult. engrs. CD 5/31—ENR 9/31.

Wash., Sequim—DAIRY—Sequim-Dungeness Co-operative, Dairy, Sequim, 1 story, 105x117 ft. masonry dairy, **$100,000.** Financing provided. Pyramid Co., 320 5 Ave. N., Seattle, consult. engrs.

Wash., Tieton — COLD STORAGE — F. H. Cubberly Fruit Co., Tieton, plans cold storage service bldg. **$105,000.**

★**Wis., Milwaukee**—FACTORY—Heil Co., 3000 W. Montana St., plans under way, 1 story, 87x368 ft., and 1 story, 242x302 ft., steel, brick factory addns. W. Oklahoma and S. 5 Sts. **$500,000.** R. Leary, c/o owner, engr.

Wis., Wisconsin Rapids—FACTORY—Consolidated Water Power & Paper Co., 1 story, 40x300 ft., steel, brick factory, concrete fdn. W. F. Thiele, ch. engr.

★**Wyo., Casper** — REFINERY PLANT — Texas Co., Casper, plans under way imprv. refinery plant, incl. crude still unit and unit for making road oils and asphalt products, **$3,000,000;** refinery plant imprvs., incl. fluid catalytic cracking and gas recovery unit, **$3,000,000.** Financing provided.

Alaska—OIL PLANTS—Standard Oil Co., 225 Bush St., San Francisco, Calif., bulk oil plants at Dillingham and Naknek Bay, **$105,-000.**

Alta., Edmonton — STORAGE — Storage & Carting Co., Ltd., Edmonton, storage bldg. **$300,000.**

B. C., Kelso—MINING DEVELOPMENT—Slocan Charleston Mining Co., Ltd., Kelso, mining development on 180 acres, **$100,000.**

B. C. Vancouver — FACTORY — Picardy Candy Shops, Broadway and Colony Sts., Winnipeg, Man., plans by Adamson & Morgan, 906 Yonge St., Toronto, Ont., candy factory, bakery and stores, York St. and Burrard Bridge, **$250,000.** CD 5/29—ENR 6/13.

N. B., Saint John—OIL REFINERY—Superline Oils, Ltd., Saint John, oil refinery, **$150,-000.**

N. S., Hantsport—FACTORY—The Canadian Keyes Fibre Co., Ltd., Hantsport, factory. **$200,000.**

N. S., Kentville—TERMINAL-GARAGE—United Services Corp., 7 Main St., bus terminal and maintenance garage. **$100,000.**

Ont., Morrisburg — FACTORY — Manley Bourke, Sun Life Bldg., Montreal, Que., plans by A. L. Perry, 1502 St. Catherine St. W., Montreal, Que., 1 story, bsmnt., 60x80 ft., rein-con. stocking factory, High St. **$55,000.**

Ont., Red Lake—DIAMOND DRILLING—Lauder Red Lake Mines, Ltd., Red Lake, 20,000 ft. diamond drilling, etc. **$100,000.** Dr. G. D. Ruttan, c/o owner, engr.

Ont., Toronto—WAREHOUSE, etc.—European Silk Co., 110 Wellington St. W., plans by C. J. A. Hallwell, 88 Gerard St. W., 3 story, bsmnt., 37x155 ft., widening to 49 ft. at rear, brick, steel, warehouse and office. **$100,000.** CD 4/1—ENR 5/2.

Ont., Toronto — PLANT — Planters Nut & Chocolate Co., Ltd., 71 Florence St., plans by J. H. Haffa, 56 Bloor St. W., plant addn., extens. **$75,000.**

Ont., Toronto—FACTORY—Toronto Factory Properties, Ltd., 42 Osler Ave., plans by J. A. Thatcher, 37 Cowan Ave., 3 story, 110x120 ft. and 100x108 ft., brick, steel factory addns. **$75,000.**

★**Ont., Weston**—PLANT—G. Weston, Ltd., R. A. Robertson, secy., 134 Peter St., Toronto, plans by Ross & Ross, Dominion Square Bldg., Montreal, Que. and C. B. Dolphin, 415 Eastern Ave., Toronto, plant, **$1,200,-000.** CD 12/5—ENR 12/27/45.

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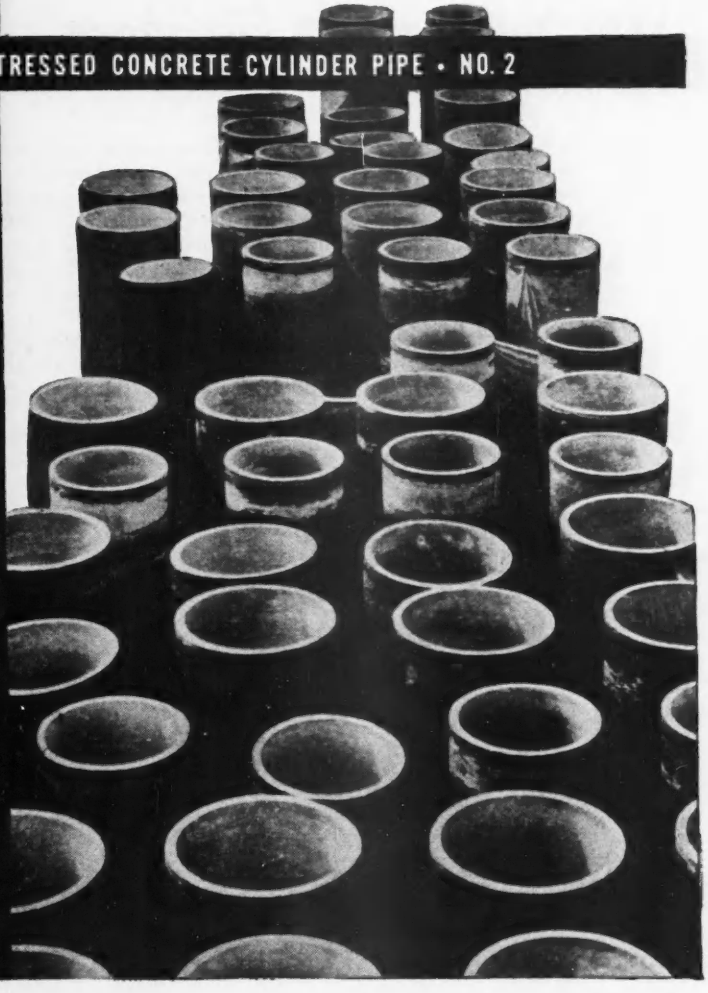

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INDUSTRIAL BLDGS. (Proposed Work, Cont'd.)

Que., Montreal—PLANT—Canadian Liquid Air Co., Ltd., 7 Viau St., storage plant. **$75,000.**

Que., St. Elie de Paxton (P. O. St. Elie)—DIAMOND DRILLING—Candego Mines, Ltd., c/o Stewart Troop, St. Elie de Paxton, diamond drilling. **$300,000.**

UNCLASSIFIED

PROPOSED WORK

Alabama—TRANSMISSION LINES — Coosa Valley Electric Co-operative, Inc., Talledega, 201 mi. electric transmission lines and sys. imprvs., Talledega Co. **$355,000.**

★**Alabama**—TRANSMISSION LINE—Wiregrass Electric Co-operative, Inc., Hartford, 459 mi. electric transmission line and sys. imprvs., Geneva Co. **$635,000.**

Arizona—TRANSMISSION LINE—Graham Co. Electric Co-operative, Inc., Safford, 113 mi. electric transmission line, Graham Co. **$295,000.**

★**Arkansas** — TRANSMISSION LINE — Arkansas-Missouri Power Corp., Blytheville, high voltage electric transmission line between Greene-Craighead Co. line to Paragould, Blytheville and Rector. **$670,000.**

★**Arkansas** — TRANSMISSION LINE — Arkansas Valley Electric Co-operative Corp., Ozark, 462 mi. electric transmission line and sys. imprvs., Franklin Co. **$620,000.**

Arkansas—TRANSMISSION LINE—Ashley-Chicot Electric Co-operative, Inc., Harrisburg, 137 mi. electric transmission line, Ashley Co. **$190,000.**

California—TRANSMISSION LINE—Mesa Electric Co-operative, Inc., Phelan, 198 mi. electric transmission line, Los Angeles and San Bernardino Counties. **$270,000.**

★**Colorado**—TRANSMISSION LINE—Morgan County Rural Electric Assoc., Fort Morgan, 248 mi. electric transmission line and sys. imprvs., Morgan Co. **$540,000.**

Colorado — TRANSMISSION LINE — Union Rural Electric Assoc., Inc., Brighton, 218 mi. electric transmission line and sys. imprvs., Adams Co. **$393,000.**

Florida—TRANSMISSION LINE — Central Elec. Co-operative, Inc., Chiefland, 82 mi. electric transmission line and sys. imprvs., Levy Co. **$173,000.**

Florida—RURAL ELECTRIC DISTRIBUTION SYSTEM—Palquin Electric Co-Operative, Inc., Quincy, plans completed, rural electric distr. sys. in Gadsden Co. **$165,000** REA loan. Rural Electrification Admin., Atlanta, Ga., consult. engrs.

Florida — TRANSMISSION LINE — Sumter Electric Co-operative, Sumterville, 313 mi. electric transmission line, sys. imprvs., Sumter Co. **$494,000.**

★**Georgia**—TRANSMISSION LINE—Central Georgia Electric Mbr. Corp., Jackson, 270 mi. electric transmission line and sys. imprvs., Butts Co. **$507,000.**

Georgia—POWER LINES—Coweta-Fayette Electric Mbr. Co-operative, Newnan, rural power lines, Coweta Co. **$350,000.** Financing provided.

Georgia—POWER LINES—Jackson Electric Mbr. Co-operative, Jefferson, 177 mi. rural power lines, Jackson Co. **$275,000.** Financing provided.

Georgia—POWER LINES—Satilla Rural Electric Mbr. Co-operative, Alma, rural power lines, Bacon Co. **$436,000.** Financing provided.

Georgia—TRANSMISSION LINE—Snapping Shoals Elec. Mbr. Corp., Covington, 140 mi. electric transmission line, Newton Co. **$221,000.**

Georgia — TRANSMISSION LINE — Walton Elec. Mbr. Corp., Monroe, 219 mi. electric transmission line, Walton Co. **$341,000.**

Illinois—RURAL ELETRIC LINES—Egyptian Electric Co-operative Assn., Steeleville, rural electric lines, Jackson Co. and vicinity. **$280,000** REA allot.

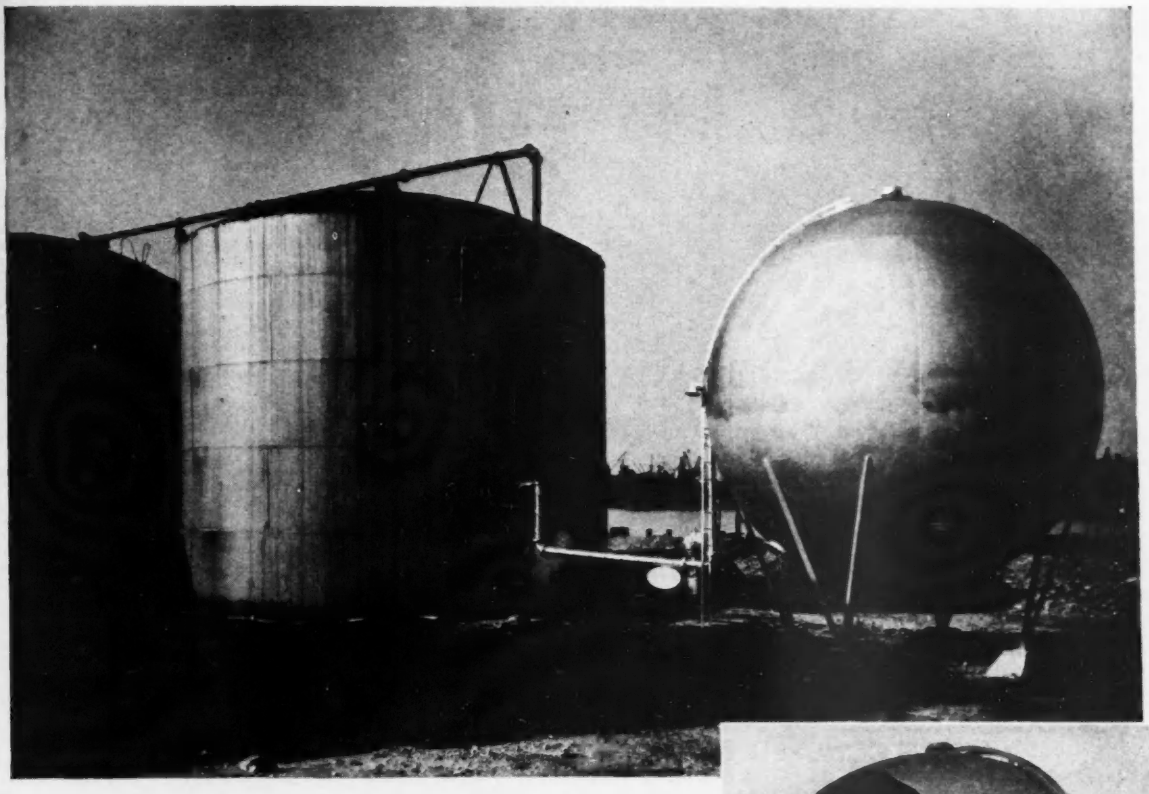
Illinois—RURAL ELECTRIC LINES—Illinois Rural Electric Co-operative Winchester, addnl. rural electric lines, Pike and Scott Counties, etc. **$175,000** REA allot.

Illinois—TRANSMISSION LINES — Illinois Valley Electric Co-operative, Inc., Princeton, 100 mi. electric transmission lines and sys. imprvs., Bureau Co. **$160,000.**

★**Illinois**—RURAL ELECTRIC LINES—Menard Electric Co-operative, Petersburg, 344 mi., addnl. rural electric lines, Menard Co. **$500,000.** Financing provided.

Illinois—ELECTRIC TRANSMISSION LINE—Norris Electric Co-operative, Newton, 327 mi. electric transmission line, Jasper Co. **$465,000.**

Ill., Peru—STADIUM—St. Bede College, Peru, 5,000 persons seating capacity St. Bede Memorial Stadium. **$100,000.**



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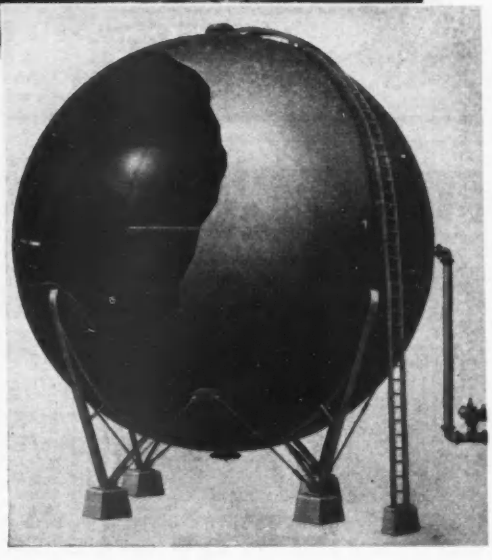

Top: A 5,000 cu. ft. Horton Vaporsphere connected to two flat-bottom tanks storing motor gasoline. It is located at the Hempstead Oil and Storage Company, Mobile, Alabama.
Below: Cutaway view of a Vaporsphere showing the flexible membrane connected to the shell at the equator. When vapor is displaced from the tanks it flows into the space in the Vaporsphere between the membrane and the lower half of the shell. This causes the flexible membrane to billow upward to make room for the incoming volume of vapor. This operation is reversed when condensation due to lower temperature causes vapor to flow back into the tanks.

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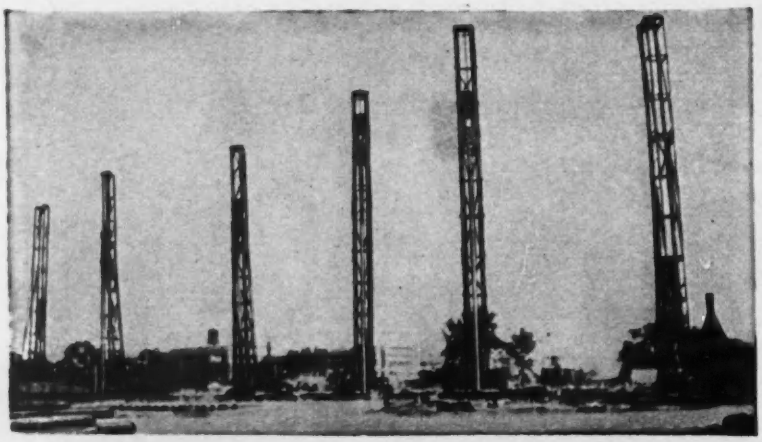

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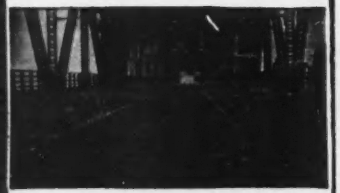

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UNCLASSIFIED (Proposed Work, Cont'd.)

Ill., Salem — ELECTRIC DISTRIBUTION SYSTEM—City, C. A. McGraw, clk., City Hall, electric distr. sys., street lighting, standards, lanterns, etc. $280,000. Warren & Van Praag, Inc., Decatur, consult. engr. CD 1/30—ENR 2/21.

Indiana—ELECTRIC TRANSMISSION LINE—Jasper County Rural Electric Mbr. Corp., Rensselaer, 186 mi. electric transmission line, Jasper Co. $235,000.

Ind., Evansville—SWIMMING POOL—Park Bd., D. Davis, secy., City Hall, 75 x 165 ft., concrete swimming pool, Mesker Park, $121,000; concrete swimming pool, Reichert Park, $68,000. Financing not provided.

★**Iowa and Nebraska** — NATURAL GAS PIPELINES—Northern Natural Gas Co., Aquila Court, Omaha, Neb., exten. natural gas pipelines to Webster City, Madrid, Granger, Grimes and Boone, Ia., and increasing capacity of lines in Iowa, Nebraska and Minnesota, constructing compressor stations at Cherokee and Oakland, Ia., and South Sioux City, Neb., constructing 200 mi. pipeline. $7,886,076.

★**Iowa**—GENERATING FACILITIES—Federated Co-operative Power Assoc., Hampton, new generating facilities, Franklin Co. $1,100,000.

★**Ia., Ames**—FIELD HOUSE—Iowa State College, Ames, 15,000 persons seating capacity, field house. Over $500,000.

★**Kansas**—GAS TRANSMISSION LINE—Cities Service Gas Co., 75 St. and 50 Hy., Kansas City, Kan., 405 mi. 26 in. gas transmission line between Hugoton, through Newton and Emporia to Kansas City. $21,000,000. Financing provided.

Kansas—TRANSMISSION LINE—D. S. & O. Rural Electric Co-operative Assoc., Inc., Solomon, 325 mi. electric transmission line and sys. imprvs., Dickinson Co. $411,000.

Kansas—TRANSMISSION LINES—P. R. & W. Electric Co-operative Assoc., Inc., Wamego, 170 mi. electric transmission line, Pottawatomie Co. $238,000.

Kentucky—TRANSMISSION LINES—Hickman-Fulton Counties Rural Electric Co-operative Corp., Hickman, 219 mi. electric transmission line and system imprvs., Fulton Co. $331,000.

★**Kentucky** — ELECTRIC TRANSMISSION LINES—Inter County Rural Electric Co-operative Corp., Danville, 423 mi. electric transmission lines and sys. imprvs., Boyle Co. $624,000.

★**Kentucky** — ELECTRIC TRANSMISSION LINES—Jackson County Rural Electric Co-operative Corp., McKee, 447 mi. electric transmission line and system imprvs., Jackson Co. $670,000.

Louisiana—TRANSMISSION LINE — Claiborne Elec. Co-operative, Inc., Homer, 250 mi. electric transmission line and office bldg., Claiborne Co. $470,000.

Louisiana—TRANSMISSION LINE — Dixie Electric Mbr. Co-operative, Courthouse, Baton Rouge, 96 mi. electric transmission line and sys. imprvs., East Baton Rouge Co. $154,000.

La., Houma—SUBMARINE CABLE—Southern Bell Telephone & Telegraph Co., 520 Baronne Ave., New Orleans, submarine cable for transmission under and across Bayou Terrebonne.

★**La., Lake Charles**—LAKEFRONT BEAUTIFICATION, etc.—City, T. C. Price, mayor, lakefront beautification project, incl. hydraulic fill of Lake Gid. of approx. 90 acres, playgrounds, parks, concrete swimming pool, camp houses, comfort stations, etc. $3,000,000. Financing not provided.

★**Minnesota** — ELECTRIC TRANSMISSION LINE, etc.—Carlton County Co-operative Assoc., Kettle River, 56 mi. electric transmission line and addnl. generating capacity, Carlton Co. $670,000.

Minn., St. Paul — AIRPORT SHOPS — Northwest Airlines, C. Hunter, pres., 1885 University Ave., altering bldgs. leased at Holman Municipal airport to make overhauling shops for large planes. $250,000.

Mississippi—PIPELINE GATHERING SYSTEM—Gulf Refining Co., 810 Poindexter St., Jackson, 56 mi. 14 in. pipeline gathering sys., Lamar Co. $375,000. Financing provided.

★**Mississippi** — ELECTRIC TRANSMISSION LINE—Natchez Trace Electric Power Assoc., Houston, 550 mi. electric transmission line, Chickasaw Co. $650,000.

Mississippi—NATURAL GAS PIPELINE—Southern Natural Gas Co., Prentiss, 60 mi. connecting natural gas pipeline, Jefferson Davis Co. $175,000. Financing provided.

Missouri—RURAL ELECTRIC LINES—New-Mac Electric Co-operative, Inc., Neosho, addnl. rural electric lines, Newton Co. and vicinity. $266,000 REA allot.

Missouri — ELECTRIC TRANSMISSION LINES—Nodaway Worth Electric Co-operative, Inc., Maryville, 173 mi. electric transmission lines, Nodaway Co. $229,000.

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In small bridges, culverts and sewers where headroom is limited and greater hydraulic efficiency is demanded, use Toncan Iron Sectional Plate Pipe Arch. It provides a low wide arch 6 to 15 feet in diameter, supported by its own corrugated base, which moves water fast, keeps its level down and eliminates ponding.

These efficient waterways are made from Toncan Iron, an alloy of highly refined open-hearth iron, to which has been added twice as much copper as found in copper-bearing irons and steels, PLUS molybdenum. As a consequence, drainage structures made from this durable material resist rust and corrosion caused by soil, water or sewage.

These facts are important—but Toncan Iron Sectional Plate Pipe Arch offers other advantages, too. It is corrugated, which makes it 7 to 12 times stronger than flat plate of equal thickness. Shipped knocked down, it reduces freight, handling and hauling costs. Nut and bolt assembly assures fast erection on the job by unskilled labor using simple tools. And it is strong, flexible, able to stand tremendous loads without cracking or crumbling. The extra strength, plus the rust-resistance of Toncan Iron, makes it last for years, gives it 100% salvage value.

There is a Toncan Iron man near you. He will be glad to furnish you with full details about Toncan Iron Sectional Plate Pipe Arch. When it's drainage . . . call your Toncan Iron Man.

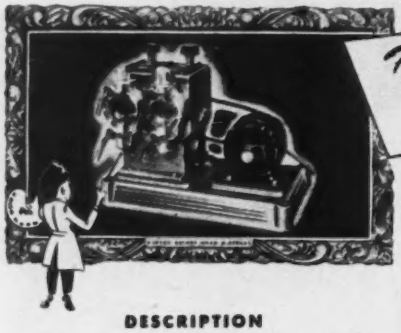
Here is a complete list of Toncan Iron Drainage Products

- CORRUGATED METAL PIPE
- PERFORATED CORRUGATED METAL PIPE
- CORRUGATED METAL PIPE ARCH
- CORWEL SUBDRAINAGE PIPE
- SECTIONAL PLATE PIPE
- SECTIONAL PLATE ARCHES
- SECTIONAL PLATE PIPE ARCH
- FLOOD GATES

Toncan Culvert Manufacturers' Association

1112 Standard Bank Building, Cleveland 13, Ohio

Toncan Iron . . . A product of Republic Steel Corporation



DESCRIPTION

%Proportioneers% Duplex Chem-O-Feeder is a constant rate of feed duplex diaphragm pump with two reagent heads for feeding one or two liquids. The unit is provided with standard "See-Thru" plastic reagent heads and the feed of each pump is manually adjustable while pump is operating by means of stroke length adjustment knob. The mechanism is enclosed in an oil bath and the stroking arrangement is designed for feeding an almost constant stream. This unit is provided with ¼ HP or ¼ HP motor for feeding against positive pressures of up to 100 lbs. per square inch.

CHEMICALS HANDLED

Calcium and sodium hypochlorite — aqua ammonia — aluminum sulphate — sodium carbonate — lime slurry — caustic — carbon slurry — ferric chloride — ferric sulphate, etc.

SPECIFICATIONS
(per pump head)

Stroke length . . . . . 0 to 0.25"
Delivery per stroke . . 0 to 9.5 cc (at 10 lbs.)
0 to 8.3 cc (at 100 lbs.)
Stroking rate . . 17, 32, 57 strokes per minute
Maximum capacity . . . 8.6 GPH (at 10 lbs.)
7.5 GPH (at 100 lbs.)
Maximum operating pressure —
125 lbs. per sq. inch. for intermittent duty
100 lbs. per sq. inch. for continuous duty
Maximum chlorine feed per 24 hours using 12½% sodium hypochlorite solution . 200 lbs.

TYPICAL USERS

Water Plants (municipal and private) • Swim Pools (municipal and private) • Bottling Plants, Bleacheries • Oil Producers (secondary recovery) etc.

SHIPPING INFORMATION

Net weight . . . . . 110 lbs.
Gross weight . . . . . 140 lbs.
Box size . . . . . 20" x 14" x 18"

% PROPORTIONEERS, INC.%

92 CODDING ST., PROVIDENCE 1, R. I.

The Sauerman Tower Machine that looms up in the background is completing a basin 1250' long, 360' wide and 30' deep which it dug in 182 working days for a sewage treatment plant. The machine loaded the spoil into contractors' dump cars for haulage to a fill.

SAUERMAN *Long Range* MACHINES

Crescent Scraper Bucket
An exclusive feature of Sauerman Scraper Machine is the Crescent bottomless bucket which handles large loads faster and with less line-pull than any other scraper. Digs in any kind of dry ground or under-water.

Time and labor are saved by combining digging, hauling and dumping in a continuous process with one operator. Rapid and dependable handling with *minimum* of cost. Sauerman Machines provide wide range of handling capacities and operating spans. Specifications of types and sizes shown in Sauerman catalogs. Send for your copy NOW.

SAUERMAN BROS., Inc.

532 S. CLINTON STREET. • CHICAGO 7, ILLINOIS

UNCLASSIFIED (Proposed Work, Cont'd.)

Missouri — ELECTRIC TRANSMISSION LINES—Northwest Missouri Electric Co-op., Savannah, 172 mi. electric transmission lines and system imprvs., Andrew Co. **$270,000.**

Missouri—RURAL ELECTRIC LINES—Osage Valley Co-operative, Butler, addnl. 200 mi. rural electric lines, Bates Co. and vicinity. **$287,000** REA allot.

Missouri — RURAL ELECTRIC LINES — Ozark Border Electric Co-operative, Poplar Bluff, rural electric lines, Butler Co. **$221,000.** Financing provided.

Missouri — RURAL ELECTRIC LINES — Platte-Clay Electric Co-operative, Inc., Platte City, addnl. rural electric lines, Clay and Platte Counties. **$291,000.** Financing provided.

Missouri—RURAL ELECTRIC LINES—Tri-County Electric Co-operative Assn., Lancaster, addnl. rural electric lines, Schuyler Co. **$334,000.** Financing provided.

★**Mo., St. Louis**—AIRPORT—City, c/o M. M. Kinsey, pres., Bd. P. Serv., 304 City Hall, Zone 3, secondary airport in Columbia-Hampton Ave. Section., incl. administration bldg., several hangars, runways, lighting facilities, drainage, etc., **$1,300,000;** secondary airport in vicinity of Morganford and Weber Rds., administration bldg., hangars, runways, lighting and drainage facilities, etc., **$1,000,000.**

Montana — ELECTRIC TRANSMISSION LINES, etc.—Beartooth Electric Co-operative, Inc., Red Lodge, 92 mi. electric transmission line and sys., Carbon Co. **$140,000.**

Montana — ELECTRIC TRANSMISSION LINES—Missoula Electric Co-operative, Inc., Missoula, 125 mi. electric transmission lines, Missoula Co. **$180,000.**

Nebraska—TRANSMISSION LINES—Butler County Rural PP Dist., David City, 166 mi. transmission lines, Butler Co. **$225,000.** REA allot. R. Reed, Columbus, engr. CD 7/24—ENR 7/26.

Nebraska—TRANSMISSION LINES—Custer Co. PP Dist., Broken Bow, transmission lines, Custer Co. **$176,000.** R. Reed, Columbus, consult. engr. Financing provided, plans incomplete.

Nebraska—TRANSMISSION LINES—Wayne Rural PP Dist., Wayne, 143 mi. transmission lines in Wayne, Pierce, Stanton, Cedar and Thurston Counties. **$187,000.** H. H. Henningston, Standard Oil Bldg., Omaha, engrs. CD 6/7.

Nebraska — ELECTRIC TRANSMISSION LINE, etc.—York County Public Power Dist., York, 226 mi. electric transmission line and sys. imprvs., York Co. **$361,000.**

N. Y., New York—COMFORT STATION—Dpt. Parks, Arsenal Bldg., Central Park, 64 St. and 5 Ave., New York, plans completed by Wm. W. Forster, c/o owner, comfort stations at playground, Bronx Park, Southern Blvd. near 185 St., **$34,000;** in Bronx Park near 180 St., **$25,000;** Fulton Park playground, between 169 and 170 Sts., **$29,000;** Pierce Ave. between Newport and Tenbroeck Aves, **$56,000;** Samuel H. Young Park, Tremont and Westchester Aves. and Hutchinson River Parkway, **$41,000;** playground at Cypress Ave., 133 St. and Bruckner Blvd., **$24,000.** Financing provided.

N. Y., Rochester—STADIUM—Aquinas Institute, 1127 Dewey Ave., plans by F. M. Quinlan, 8 Exchange St., stadium. **$160,000.**

North Carolina—RURAL ELECTRIC LINES—Blue Ridge Electric Membership Corp., Lenoir, approx. 300 mi. rural electrification lines, Caldwell Co. **$360,000.** V. O. Vannort, S. Tryon St., Charlotte, consult. engr.

★**North Carolina**—TRANSMISSION LINES—Davie Electric Membership Corp., Mocksville, approx. 600 mi., rural electric lines, Davie Co., **$639,000.** V. O. Vannort, S. Tryon St., Charlotte, consult. engr.

North Carolina—RURAL ELECTRIFICATION LINES—Randolph Electric Membership Corp., Asheboro, rural electrification lines, Randolph Co. **$414,500.** B. O. Vannort, S. Tyron St., Charlotte, consult. engr. CD 6/9/45—ENR 7/5/45.

North Dakota—ELECTRIC TRANSMISSION LINE—Cass County Electric Co-operative, Inc., Kindred, 278 mi. electric transmission line, Cass Co. **$400,000.**

†**O., Wilmington**—AIRPORT BLDGS., etc.—U. S. Eng., P. O. Box 1234, Cincinnati, Zone 1, warehouses, office bldgs., and control tower, Clinton County Airport, Ser. No. 33-015-46-72.

★**Okla., Blackwell** — GAS LOOP PIPE-LINE—Cities Service Gas Co., Kansas City, Kan., plans under way natural gas loop pipelines to existing pipeline main, **$600,000.** Financing provided.

†**Okla., Ft. Sill**—AIRFIELD GRADING, etc.—U. S. Eng., P.O. Box 61, Tulsa, Zone 2, plans completed airfield, grading, paved runways, taxiways, and runways, apron, drainage, etc., field lighting sys. **$265,000.** Financing provided.

Oregon-Washington — RURAL ELECTRIC DISTRIBUTION LINES—Columbia Co. Rural Electrification Assn., Inc., Dayton, Wash., rural electric distr. lines in Columbia and Walla Walla Counties, Wash., and Umatilla Co., Ore. **$330,000.**

UNCLASSIFIED (Proposed Work, Cont'd.)

Pennsylvania—ELECTRIC TRANSMISSION LINE—Northwestern Rural Electric Co-operative Assoc., Inc., Cambridge Springs, 92 mi. electric transmission lines, Crawford Co. **$125,000.**

South Carolina—ELECTRIC TRANSMISSION LINES, etc.—Horry Electric Co-operative, Inc., Conway, 108 mi. electric transmission line and sys. imprvs., Horry Co. **$240,000.**

Tennessee — ELECTRIC TRANSMISSION LINE—Appalachian Electric Co-operative, Jefferson City, 269 mi. electric transmission lines, Jefferson Co. **$350,000.**

★**Tennessee** — ELECTRIC TRANSMISSION LINES, etc.—Tennessee Valley Electric Co-operative, Savannah, 376 mi. electric transmission line and sys. imprvs., Hardin Co. **$567,000.**

Texas — TRANSMISSION LINES — Bartlett Electric Co-operative, Inc., Bartlett, plans under way, 125 mi. rural electric power transmission lines, Bell Co. **$152,000.** Financing provided.

Texas—RURAL ELECTRIC LINES—Coleman County Rural Electric Co-operative, Inc., Coleman, plans completed 260 mi. rural electric power transmission lines, Coleman Co. **$287,000.** Financing provided.

Texas — TRANSMISSION LINES — Jackson Electric Co-operative, LaWard, plans under way, rural electric power transmission lines, Jackson Co. **$321,000.** Financing provided.

Texas—ELECTRIC TRANSMISSION LINE—Karnes Electric Co-operative, Inc., Karnes City, 250 mi. electric transmission line, Karnes Co. **$260,000.**

Texas—TRANSMISSION LINES—McLennan County Electric Co-operative, Inc., McCregor, plans under way, 164 mi. rural electric power transmission lines, McLennan Co. **$172,000.** Financing provided.

Texas — TRANSMISSION LINES — Magic Valley Electric Co-operative, Inc., Mercedes, plans completed 150 mi. rural electric power transmission lines, Hidalgo Co. **$187,000.** Financing provided.

Texas—TRANSMISSION LINES——New Era Electric Co-operative, Inc., Athens, plans under way 267 mi. electric power transmission lines and sys. imprvs. **$395,000.** Financing provided.

Texas — TRANSMISSION LINES — North Plains Electric Co-operative, Inc., Perryton, plans under way, 209 mi. rural electric power transmission lines, Ochiltree Co. **$200,000.** Financing provided.

Texas—TRANSMISSION LINES—San Bernard Electric Co-operative, Inc., Bellville, plans under way, 131 mi. rural electric power transmission lines, Austin Co. **$190,000.** Financing provided.

★**Texas**—CRUDE OIL PIPELINE—Texas-New Mexico Pipeline Co., 720 San Jacinto St., Houston, plans completed 470 mi. 16 in. crude oil pipeline main between Crane and Houston. **$12,000,000.** Financing provided.

†**Tex., Corpus Christi**—AIRFIELD HOUSES—Yards & Docks Annex, Navy Dpt., Arlington, Va., plans 75% completed permanent type houses at Cabiniss Field. **$205,000.** Financing provided.

Tex., Freeport—WHARF—Dow Chemical Co., Freeport, plans under way, rein.-con. wharf. **$186,400.** Financing provided.

Tex., Houston—HANGAR—City, City Hall, 130x160 ft., steel frame hangar. **$100,000.** Financing provided. G. L. Fugate, City Hall, engr.

★**Virginia** — ELECTRIC TRANSMISSION LINES—Mecklenburg Electric Co-operative, Chase City, 425 mi. electric transmission lines, Mecklenburg Co. **$576,000.**

Washington—ELECTRIC TRANSMISSION LINE, etc.—Benton Rural Electric Assoc., Prosser, 238 mi. electric transmission line and sys. imprvs., Benton Co. **$350,000.**

Washington—ELECTRIC TRANSMISSION LINE, etc.—Columbia County Rural Electric Assoc., Inc., Dayton, 260 mi. electric transmission lines and sys. imprvs., Columbia Co. **$330,000.**

Wisconsin — ELECTRIC TRANSMISSION LINES—Bayfield Electric Co-operative, Inc., Iron River, 93 mi. electric transmission line, Bayfield Co. **$140,000.**

Wis., Milwaukee—HANGAR—Milwaukee Co., Court House, 1 story, 140x180 ft., steel airplane hangar. **$179,350.** Wm. F. Cavanaugh, engr.

★**Alberta** — RAILWAY — Highwood Western Railway Co., Ltd., Highwood, 42 mi. railway from Okotoks to Highwood Collieries. **$3,000,000.**

British Columbia—POWER DEVELOPMENT—B. C. Power Comn., Victoria, power development, plant, Cayoosh Creek, 4 mi. from Lillooet. **$100,000.**

RICHMOND PRODUCTS
FOR CONCRETE FORM-WORK

CORRECTLY ENGINEERED TO SAVE TIME AND LABOR ON YOUR JOB!

Richond offers—consultation on best types of forms and ties to be used for a given job; estimates on job requirements and recommendations on specific form problems. All of this is without obligation. Richmond's method of packing and shipping is a distinct service in itself.

Savings are assured because Richmond reusable Accessory devices; known as "Working Parts," are furnished RETURNABLE FOR FULL CREDIT —no rentals charged.

	TIE	TYPE		SAFE LOAD	USE
TYING DEVICES	SNAP-TY		CONE	3000#	Unfinished Foundation Walls
			½ Break	3000#	Finished Foundation Walls
	AC FORM TY		PULLOUT	3000#	Exposed Architectural Concrete Walls
			BREAK BACK ½"	3000#	
	TYLOOP		½ x 4	3000#	Miscellaneous Tie used with 9 Wire, 6 strands for ½ — 10 strands for ¾
			¾ x 6	5000#	
	TYSCRUS		½	3000#	Heavy Foundations—Small Bridges
			½ Waterseal	5000#	Watertight Structures
			¾	9000#	Large Bridge Structures
			1" 2 Strut	14000#	Massive Piers & Dams
			1" 4 Strut	25000#	Steel or Heavy Timber Form Work
ANCHORING DEVICES	TYLOOP		½ x 4	1500#*	Form & Scaffold Anchorage
			¾ x 6	3000#*	Form & Scaffold Anchorage
			¾ Flared 2 Strut	9000#*	Light Lift Form Anchorage
			1 Flared 4 Strut	14000#*	Heavy Lift Dam Form Anchorage
	CRIMPED ANCHOR DOWEL		½ x 22"	5000#*	Tyscru Anchorage to Concrete
			¾ x 27"	9000#*	Tie Downs to Concrete
			1 x 32"	14000#*	Lift Form Diagonal Tie Anchorage
	SWEDGED 15° ANCHOR DOWEL		½ x 28"	5000#*	Tyscru Anchorage to Rock
			¾ x 33"	9000#*	Lift Form Anchorage to Rock
			1 x 38"	14000#*	Tie Downs to Rock
	RICHMOND SCREW ANCHOR		1"	14000#*	Invert Form Anchorage
			1¼"	21000#*	Heavy Form Anchorage
			1½"	32000#*	Cantilever Form Anchorage
HANGING DEVICES	TYHANGER		½"	6000#**	Heavy Slab Form Support
			¾	10000#**	Bridge Deck Form Support
			1"	20000#**	Pier & Dock Form Support
	HANGER-TY		½"	1800#	Fireproofing Hanger
			¾	2500#	Light Deck Form Hanger
	HANGER FRAME		½	6000#**	Flat Slab Form Hanger
	FASCIA HOOK		½	800#***	Fascia Form Tie

*3000# Max. in concrete covered ** For full load on both legs of hanger *** Optional at 1200#

Form-Ty Engineering Guide on Request

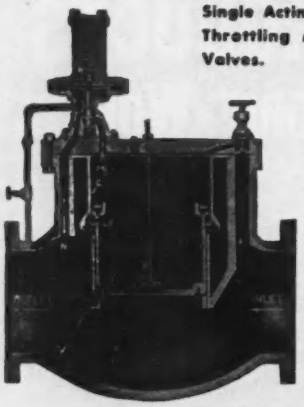
SEE OUR CATALOG IN SWEET'S

RICHMOND SCREW ANCHOR COMPANY, INC.

816 LIBERTY AVENUE-BROOKLYN, NEW YORK

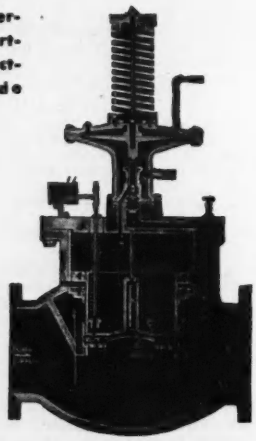
MANUFACTURING SINCE 1911

Golden-Anderson Single Acting Semi-Throttling Altitude Valves.



For New Construction or Rehabilitation

Golden-Anderson Stop Starter Single Acting Altitude Valves.

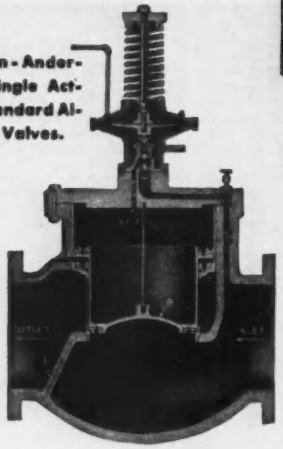


STANDARDIZE ON

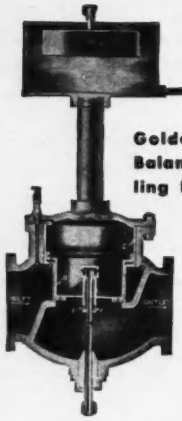
GOLDEN-ANDERSON VALVES

for Engineered Protection

Golden-Anderson Single Acting Standard Altitude Valves.



Golden-Anderson Balanced Controlling Float Valves.



A dependable source for your most Important Valve Requirements

Golden-Anderson Altitude Control Valves require no floats or complicated fixtures in their installation. They can be easily installed and protected from inclement weather to assure unfailing water service control under any climatic conditions. Sensitive operation is another outstanding feature—they faithfully maintain water levels within 3" to 12" variation and may be arranged with auxiliary equipment to perform a multiplicity of services. Write for latest technical catalog.

Let Golden-Anderson Engineers aid in your Planning

Our engineers are available to aid in the successful solution of any difficult valve problem.

GA

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write for descriptive technical catalog

CONSTRUCTION REPORTS

Bids Asked — Low Bidders — Contracts Awarded

(Daily service also available—Write for details)

Compiled by Business News Department—Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

ELSIE EAVES, Manager *J. A. MAHONEY, Reports* *J. V. McEWEN, M. R. ROESSLER, Statistics*

WATER SUPPLY

Construction Reports received since this section went to press will be found in Last Minute Construction Reports.

BIDS ASKED

Bids Asked July 1

Pa., Phila.—City Dpt. P. Wks., City Hall Annex, watermains, various locations, WW1-237; Lardners Point Pump. station addns., WW1-201. CD 3/11—ENR 3/21.

Bids Asked July 2

Minn., Mound—Village, L. V. Alwin, recdr., furnishing, installing 21,800 lin. ft. 6 in. c.i. mains, 50 hydrants, 50 gate valves, 50 tees, etc. $35,000. A. C. Smith, Waysata, engr.

S. C., Beaufort—City Comn., P. Wks. Comn., Beaufort, WW imprvs., incl. Div. 1, 15,600 lin. ft. 6- to 10-in. c.i. pipe, 50 gate valves, 20 fire hydrants, two 250 g.p.m. pump. station, Div. 2, one 100,000 gal. steel tank and tower, alternate 250,000 gal. steel tank and tower, etc. Plans deposit $5. The Harwood Beebe Co., Spartanburg, engr.

Bids Asked July 8

★**Okla., Duncan**—City, City Clerk, City Hall, water filtration plant, pipeline to Lake Duncan, pump. equip. and new stand tower, $550,000. Plans deposit $50. V. V. Long & Co., Colcord Bldg., Oklahoma City, engrs. CD 4/12—ENR 5/2.

Tex., Liberty—City, O. F. Campbell, mgr., water and sewer imprvs. $100,000. Plans deposit $20. Garrett Engrg. Co., 1800 Milam St., Houston, engrs. CD 6/21/45—ENR 7/12/45.

Bids Asked July 11

Mo., Malden—City, C. Peck, mayor, elevated water tank on tower, auxiliary piping, etc. Russell & Axon, 6635 Delmar Blvd., University City, St. Louis, Zone 5, engrs.

Ga., Thomson—City, c/o Mayor, concrete, steel water filtration plant. $100,000. Plans deposit $15. Wiedeman & Singleton, C & S Bank Bldg., Atlanta, engrs. CD 2/21—ENR 3/7.

Ill., Genesco—City, City Hall, WW imprvs. Over $22,500. Plans deposit $40. Warren & Van Praag, Inc., Standard Office Bldg., Decatur, consult. engr. CD 7/12/45—ENR 7/26/45.

Kan., Alta Vista—City, K. L. Buchman, clk., City Hall, WW sys. Plans deposit $5. Wilson & Co., 223 North Santa Fe St., Salina, engrs. CD 11/16—ENR 11/29.

Bids Asked July 22

Wis., Kimberly—Village, water treatment plant, $65,000. McMahon Engrg. Co., Menasha, engr. CD 3/7—ENR 3/21.

Bids Asked July 26

N. Y., Stony Brook—Town Clerk, Town Hall, Patchogue, lateral watermains.

Bids Asked August 5

Ind., Hammond—Bd. Water Works Trustees, S. Moskoff, secy., City Hall, 1 story, bsmnt., 87x101 ft. filtration plant expansion, filter house addn., 196x204 ft., brick, stone, rein.-con., structural steel filtered water reservoir addn. $300,000. Plans deposit $25. H. T. Tuinman, 52 Ruth St., consult. engr.

Bids Asked August 11

Ill., Salem—City, J. W. Garner, clk., water distr. lines and sewerage sys. $200,000. Warren & VanPraag, Inc., 447-450 Standard Office Bldg., Decatur, engrs. CD 5/22—ENR 5/30.

LOW BIDDERS

Ala., Birmingham — Dolly Ridge Water Corp., Birmingham, WW sys., near Birmingham waterworks, from Buchanan & Graves, 610 3 Ave. W., Proj. 1, **$32,240**, Proj. 2, **$35,113**. J. W. Goodwin Engrg. Co., 726 S. 29 St., engr.

Colo., Greeley—City, postponed bids to have been opened May 14, water treatment plant, sand filters. CD 4/18—ENR 4/25.

Conn., Hartford—Metropolitan Dist., Water Bureau, Bd. Contr. & Supply, 650 Main St., June 17, reservoir, clearing, grubbing west side and east side, Barkhamsted-Hartland, from Wyoming Calley Nurseries, Wyoming, Pa., Contr. 99, **$41,350**; Contr. 100, **$41,000**. CD 5/31—ENR 6/6.

Wash., Toppenish—City, A. A. Bennett, clk., City Hall, June 14, 37,500 ft., 6 and 8 in. asbestos cement pipe, with valves, hydrants, fittings, from H. D. Fowler Co., Smith Tower, Seattle, Zone 4. **$61,925**. CD 6/4—ENR 6/6.

Ga., Lafayette—City, imprv. WW sys., from L. A. Warlick, 747 E. 11 St., Chattanooga, Tenn. **$97,843**.

Ore., Beaverton—City, R. C. Doty, recdr., City Hall, June 11, 500,000 gal. rein.-con. reservoir and pump. stations and installing 7,880 ft. 12 in. c.i. pipe, from State Constr. Co., 1750 19 Ave. S., Seattle, Wash. **$48,640**. CD 5/28—ENR 3/7.

Ore., Portland—West Slope Water Dist., 9025 S.W. Canyon Rd., rejected bids June 10, 1 m. g. covered concrete reservoir. L.B. **$77,780**. CD 5/23—ENR 6/6.

Pa., Ridgway—Boro, rejected bids June 11 filter structures, subsidence basin structures, filter plant bldg., and outside piping, Contr. 1. CD 5/23—ENR 6/6.

Pa., Ridgway—Boro of Ridgway, G. F. Greiner, secy., May 22, Contr. 2, filter equip and piping, from Roberts Filter Co., Darby. **$29,740**. Rejected bids May 22, Contr. 1, filter plant, etc. CD 4/30—ENR 5/2.

S. C., Charleston—Comrs. Dpt. P. Wks., 14 George St., Charleston, June 17, filter bldg., pump. station, office bldg., and electric wiring and fixtures, from V. P. Loftis Co., Builders Bldg., Charlotte, N. C. **$210,163**. J. E. Gibson, engr. CD 5/14—ENR 5/16.

Tenn., Adamsville—Bd. Mayor and Comrs. Adamsville, June 12, WW sys., from Volz Constr. Co., Ripley. **$114,792**. CD 5/29—ENR 6/6.

Tex., Dallas—City, c.i. watermains in Buena Vista, from Ben Sira & Co., **3901 Elm St. $26,324**.

CONTRACTS AWARDED

Calif., Belmont—Belmont Co. Water Dist., Folger Dr., water mains, fittings, valves in and for Homeview area, to Pioneer Constr. Co., Box 411, San Mateo. **$24,029**. Awarded 6/17. W. D. Soule, 318 B St., San Mateo, engr.

Calif., Culver City—Southern California Water Co., 1016 W. 119 St., Los Angeles, water supply distr. sys., 12 in. main near and in city, own forces. **$246,690**.

O., Kirtland—Bd. Comrs. Lake Co., County Court House, watermains, to J. Valocchi, Painesville, **$71,494*****standpipe, to Pittsburgh-Des Moines Steel Co., 4614 Prospect St., Cleveland, **$19,488*****reservoir and booster pumping station, to Freeman & Jones, 6007 Eulcid Ave., Cleveland, **$19,037**. Grand total $110,019. Bids 5/27. CD 5/20—ENR 5/23.

PROJECTS COVERED

Projects—By Size

Construction projects here reported cover the United States and Canada, are of these minimum sizes or larger: water supply, earthwork, waterworks $22,500; other public works $40,000; industrial buildings $55,000; other buildings $205,000.

Classes of Construction

(Name in order of Listing)

Water Supply
Sewers, Waste Disposal
Bridges
Streets & Roads
Earthwork, Waterways
Latin America
Public Buildings
Commercial Buildings
Industrial Buildings
Unclassified

Stages Reported

PROPOSED WORK: Including appointment of engineers or architects.

BIDS ASKED (new announcements only). For full calendar, see also preceding issues of ENR.;

LOW BIDDERS: On jobs below $500,000 value all low bidder news will be the final reports published on the projects involved except where award is not made to the low bidder. In this case, a supplementary contract award report will be published.

CONTRACTS AWARDED: Except awards to low bidders previously reported in low bidder stage.

Dates shown are of issue in which last previous report was published.

Symbols and Abbreviations Include:

† Federal Government
* Project of $500,000 or over
ENR Engineering News-Record
CD Engineering News-Record Construction Daily

Fla., St. Petersburg—Pinellas Co., R. E. Green, clk., installing pipes between Walsingham reservoir and plant at Indian Rocks, to Marvin Boyce, Clearwater. **$43,426**.

O., Washingtonville — Village, water distr. sys., day labor. **$60,000**. Bids 6/6 rejected. L. B. **$79,330**. CD 6/18—ENR 6/20 under LB.

Ore., Reedsport—City, City Hall, watermains in downtown area, to Warner Bros., Eugene. **$45,000**. CD 3/26—ENR 3/28.

Utah, Pleasant Grove—Town, c/o Town Clerk, L. F. Smith, 6,400 ft. 8 in. c.i. watermain, to Niels Fugal, Pleasant Grove. **$12,000**. Bids 6/5. Caldwell & Richards, Templeton Bldg., Salt Lake City, engrs.

Tex., Houston—T. B. Hubbard Constr. Co., 1507 Delano St., c.i. water lines, facilities. Owner builds. **$26,000**. CD 6/12.

†**Va., Norfolk**—Yards & Docks Annex, Navy Dpt., Arlington, water supply rehabilitation, Naval Shipyard, NOY 13292, to A. G. Pinkston & Co., 1805 County St., Portsmouth. **$214,365**.

SEWERS, WASTE DISPOSAL

Construction Reports received since this section went to press will be found in Last Minute Construction Reports.

BIDS ASKED

Bids Asked July 2

Ga., Decatur—City, c/o manager, storm sewers. Plans deposit $15. F. M. Daves, 774 Spring St., N. W., Atlanta, engr. CD 6/14—ENR 6/27.

N. Y., Kew Gardens—President Queens Boro, 120-55 Queens Blvd., Zone 15, sanitary sewers, appurtenances in 131 St., South Conduit Ave., across Sunrise Hy., easterly and southerly sides of 131 St.; combined sewer, appurtenances, 135 Pl. 133, 131, and Sutter Aves., 133, 134 and 135 Sts.

N. Y., New York—President Manhattan Boro, Municipal Bldg., Zone 7, reconstructing sewers in W. 23 St. from 5 to 11 Aves., together with all incidental work thereto, Contr. 87.

Bids Asked July 3

Pa., Norristown—State Dpt. Property & Supplies, Capitol Bldg., Harrisburg, main trunk sewer at Norristown State Hospital. $100,000. Plans deposit $2.50. Stewart A. Jullett Co., 1200 Locust St., Phila., engrs. J. A. Warlow, c/o owner, ch. engr. CD 12/28—ENR 1/17.

Bids Asked July 9

Ill., Normal—Bd. Trustees Bloomington and Normal Sanitary Dist., Administration Bldg., Sewage Treatment Plant, West Oakland Ave. Normal, sewerage imprvs., Bloomington and Normal Sanitary Dist. Over $40,000. Plans deposit $10. J. J. Woltman, 314 Unity Bldg., Bloomington, engr.

Bids Asked July 10

Calif., Los Angeles—City, City Hall, 36,079 lin. ft. 8 in. vitr. clay sanitary sewer, Almar Ave. and Northfield St. Sewer Dist. $190,435. L. Aldrich, City Hall, engr.

Calif., Los Angeles—Los Angeles Sanitation Dist. 3, 1206 S. Maple St., 20,000 lin. ft. 30 in. vitr. sewer, North Long Beach, over $40,000; 3,000 ft. 54 in. vitr. sewer 2nd Sect. Long Beach Outfall sewer, over $40,000. Plans deposit $5 each. A. M. Rawn, 1206 S. Maple St., engr.

★**Calif., Los Angeles**—Los Angeles Co. Sanitation Dist. 2, 1206 Maple Ave., 4,300 ft. submerged sewage pipeline, Unit 1, Joint Outfall, 72 in. centrif. rein.-con. pipe, near White Point, west of San Pedro, over $500,000; Garfield Exten. Trunk sanitary sewer, 2 mi. 10-to-15-in. vitr. clay pipe, near Montebello, over $40,000; Dist. 3 Outfall Sewer from pump. station near Los Angeles River to connection with outfall at Alameda St., over $40,000. Plans deposit $5 each. A. M. Rawn, 1206 S. Maple Ave., engr.

Bids Asked July 12

Kan., Goodland—At office, R. E. Lundy, city clk., sanitary sewer extens., 7,450 lin. ft. 8 in. vitr. clay pipeline, sixty 6 in. risers, two hundred 8 in. wyes, 21 manholes, etc. Plans deposit $5. Wilson & Co., 223 N. Santa Fe St., Salina, engrs.

Bids Asked July 21

Mo., Memphis—City, exten. sanitary sewerage sys. and storm sewer. Plans deposit $10, $5 refunded. F. Beard, Kahoka, engr.

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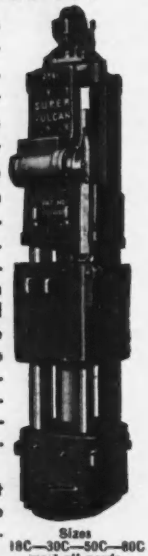

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SEWERS, WASTE DISPOSAL (Low Bidders, Cont'd.)

LOW BIDDERS

Calif., Loma Linda—Loma Linda Sanitation Dist., Court House, San Bernardino, received na bids June 17, 30,300 lin. ft. vitr. clay sanitary sewers, sewage treatment plant. Over **$150,000.** May readvertise. Currie Engrg. Co., Anderson Bldg., San Bernardino, engr. CD 5/21—ENR 6/6.

Ind., Fort Wayne—Bd. P. Wks., R. G. Beams, chn., City Hall, June 11, sewerage sys. addn., Nebraska Interceptor and pump. sta., from A. Arcari, 15100 Godard St., Detroit, Mich. **$372,306.** Est. $400,000. CD 6/6—ENR 8/5/43.

Mass., Framingham—Town, P. Wks. Dpt., Memorial Bldg., storm drains, appurtenances, from Fantoni & Bitsoli, 11 Travis Rd., Natick. **$88,784.** CD 4/22.

Ore., Portland—City, City Hall, rejected bids June 12, Columbia Slough Sewer. L.B. **$492,238.** CD 6/19, under LB.

Minn., Waseca—City, A. A. Lynch, clk., rejected bids May 24, waste lagoon, etc., about 9,200 lin.ft. canning waste sewer and relocating 1,800 lin. ft. city sewer. L.B. **$61,602.** CD 6/6—ENR 6/13, under LB.

Tenn., Memphis—City, City Hall, installing drainage facilities on Jonah Bayou, from L. & M. Constr. Co., 81 Madison Bldg. **$241,909.**

Wash., Omak—City, City Hall, May 28, 35,000 ft. 8- to 18-in. sewer mains and combined sewage treatment plant with lift station, from State Constr. Co., 1750 19 Ave. S., Seattle. **$117,813.** Est. $175,000. CD 5/3—ENR 5/9.

Wis., Wauwatosa—Town, 7701 Menomonee River Dr., Zone 13, sewers in N. 48, N. 52, S. 87, N. 54, S. 110, W. Washington Sts., N. 51 Blvd., W. Fond du Lac Ave., Lovers Lane, to O. P. Seefeld, 5101 W. State St., Milwaukee, Zone 8. **$76,271.** CD 6/12—ENR 6/20.

CONTRACTS AWARDED

Tex., Goose Creek—City, C. O. Alexander, mayor, sanitary sewers, to E. Niles, 1004 Truxillo St., Houston. **$49,111.** CD 8/8—ENR 8/23.

Calif., Lakewood Village—Montana Land Co., 2965 E. Carson St., Long Beach, 11,294 lin. ft. 15- to 21- in. sewers from Cherry to Clark Aves. along north side of Municipal Airport, to Burch & Bebek, 2803 Las Flores St., Lynwood. **$51,587.** Leeds, Hill & Jewett, 601 W. 5 St., Los Angeles, and Quinton Engrs., Ltd., 816 S. Figueroa St., Los Angeles, engrs.

Calif., Los Angeles — County Sanitation Dist., 1206 S. Maple St., 13,250 lin. ft. 10- to 15-in. vit. clay sanitary sewer, in Broadway, 174 St. to Compton, to Bebek & Berkich, 238 W. Florence Ave. **$59,810.** A. M. Rown, 1206 S. Maple St., engr.

Minn., South St. Paul—City, J. F. O'Donnell, recdr., trunk sewer in South End, to Lametti & Lametti, 615 Drake St., St. Paul. **$74,489.** Bids 6/3. CD 5/29.

Tex., Houston—T. B. Hibbard Constr. Co., 1507 Delano St., sanitary sewers. Owner builds. **$40,000.**

BRIDGES

Construction Reports received since this section went to press will be found in Last Minute Construction Reports.

BIDS ASKED

Bids Asked July 2

Mass., Barnstable—Town, Town Hall, 2 span steel girder and bascule draw bridge, concrete pier and abutments, Centerville Section, Bridge St. to Oyster Island. $165,000. Fay Spofford & Thorndike, 11 Beacon St., Boston, engrs. CD 3/12—ENR 4/4.

Bids Asked July 3

Ill., Chicago—City, Dpt. P. Wks., City Hall, electrical equip. South Canal St. Bridge. Plans deposit $25.

N. Y., New York—Triborough Bridge and Tunnel Auth., Administration Bldg., Randall's Island, Zone 35, painting Triborough bridge and approaches, and other incidental structures, Contrs. TM8, TM9, TM10 and TM8-TM9-TM10. Madigan-Hyland, 28-04 41st Ave., Long Island City, Zone 1, engrs.

Bids Asked July 9

N. Y., Geneva—Bd. P. Wks., City Hall, reconstructing 2 concrete bridges and repairing and resurfacing N. Exchange and Exchange Sts., Lake St. and Lake Rd. $55,551. Plans deposit $5. H. M. Bolton, supt.; adv. ENR 6/27.

Bids Asked July 10

Louisiana—Dpt. Hys., D. Y. Smith, dir., Baton Rouge, cleaning, repainting bridge steel, Jonesville Bridge, State Route 6, S. P. 22-07-07, Catahoula and Concordia Parishes. CD 6-13—ENR 6-20, under LB.

Bids Asked July 23

Ala., Birmingham—Comrs. Jefferson Co., Birmingham bridge over Warrior River, near Patridge Crossroads.

LOW BIDDERS

California—State Div. Hys., Sacramento, June 12, bridge, approaches, Big Butte Creek, Glenn and Butte Counties, from Kiss Crane Co., 2700 San Pablo Ave., San Pablo. **$83,931.** CD 5/20—ENR 5/23.

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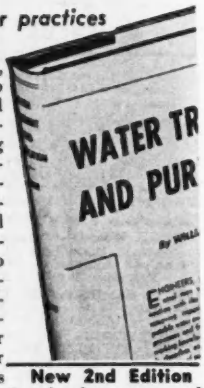

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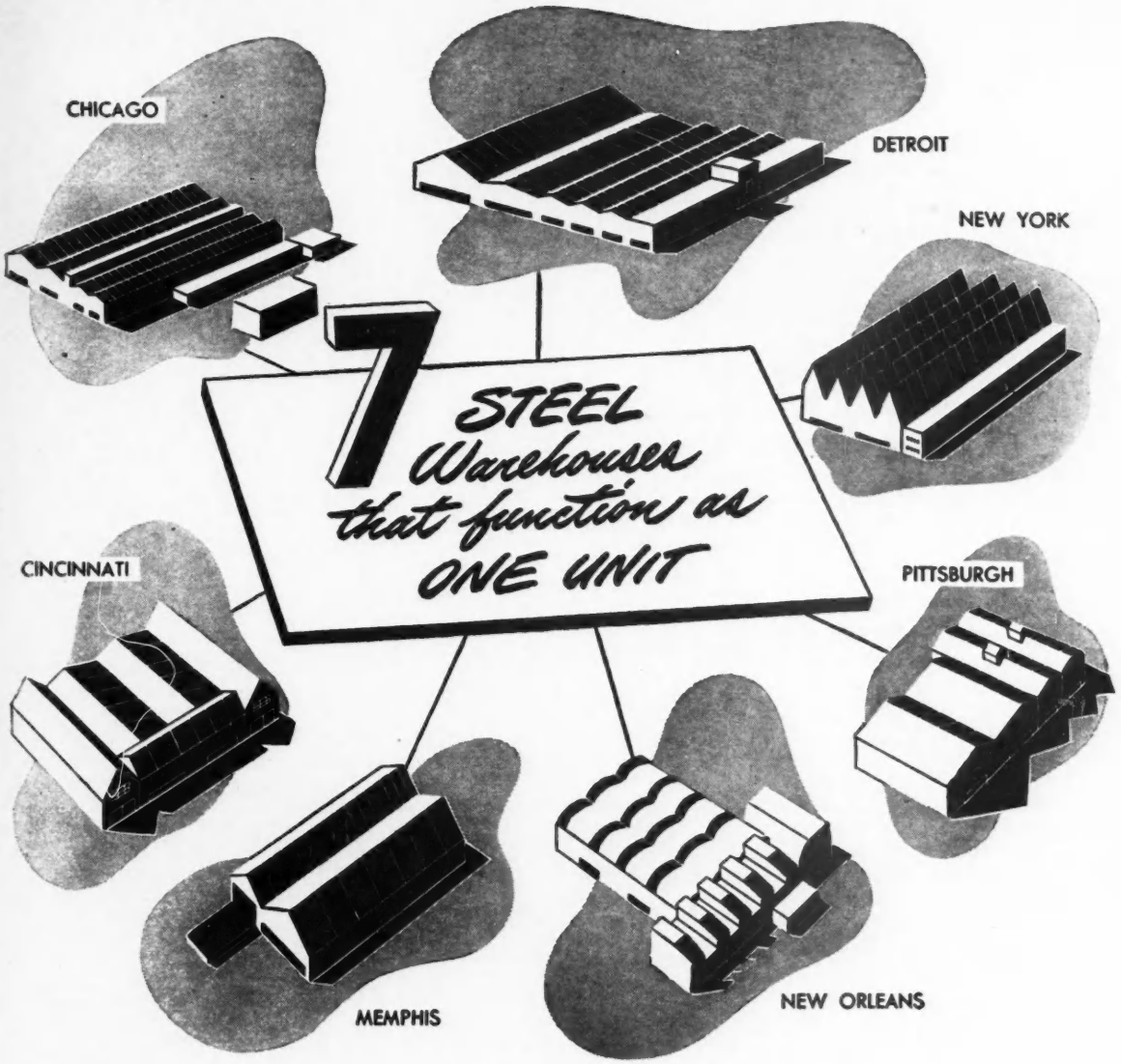

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BRIDGES (Low Bidders, Cont'd.)

Connecticut—State Hy. Dpt., Hartford, rejected bids May 27, 3 span steel I beam bridge concrete deck, 2,353 ft. 8 in. rein.-con. approaches, Danbury. L. B. **$171,709.** CD 5/31—ENR 6/6 under LB.

Connecticut—State, Wm. J. Cox, contr., Hartford, June 17, twin span steel beam bridge, skew span 94 ft. 1,051 ft. bituminous macadam Hall Ave., Wilbur Cross Parkway, Wallingford, from D. Arrigoni, 605 Main St., Middletown. **$91,109.** CD 6/5—ENR 6/13.

Illinois—State Div. Hys., Springfield, June 14, bridge, over Piles Fork, F. A. Route 14, Sec. 5 B-2, Jackson Co., from Triangle Constr. Co., 480 N. Evergreen Ave., Kankakee, **$138,667.** CD 6/7.

Kentucky—State Dpt. Hys., Frankfort, June 14, bridge, approaches 0.366 mi. Campbell Co., from Fuller-Davies Co., Covington, **$91,094**; substructure, approaches, etc. same bridge, from Hinkle Contg. Co., Paris, **$56,920.** CD 6/29—ENR 6/6.

Ohio—State Hy. Dpt., Columbus, received no bids June 11 repaving, etc., bridge, Trumbull Co.; removing portions structure, etc., Portage Co. CD 6/3—ENR 6/6.

CONTRACTS AWARDED

Alabama—State Hy. Dpt., Montgomery, railroad overpass at Repton, Conecuh Co., to Goodwyn & Murphree Co., Troy. **$59,204.** Bids 6/7. CD 5/31.

★ **Ohio**—State Hy. Dpt., Columbus, bridge over Sandy Creek, Stark and Tuscarawas Counties, to The Lewis & Frisinger Co., 214 E. Madison Ave., Ann Arbor, Mich. **$1,300,261.** Est. $1,212,600. Bids 6/11. CD 6/3—ENR 6/6.

Tenn., Memphis—City, City Hall, installing culverts on Guinea Branch drainage project between Loeb and Goodlett, to L. & M. Constr. Co., 81 Madison Bldg., **$53,270.**

Utah—State Road Comn., Salt Lake City, 85 ft. span, concrete, steel bridge over Sevier River on State Hy. between Hinckley and Delta, Millard Co., to Bether Bros., Heber City, $41,378. Est. **$44,881.**

Vt., Neuport—City, City Hall, 5 span, steel W. F. I-Beam bridge, to E. J. Bell, Pittsburg, N. H., **$194,495.** Bids 6/17, awarded 6/18. CD 6/10—ENR 6/13.

Vt., Newport—City, A. J. Beebe, clk., 300 ft. bridge, 3 span WFI beam-rein-con deck 1,200 ft. approaches, to E. L. Belle, Camp Otter, Pittsburg, N. H. **$194,494.** Bids 6/17. CD 6/11—ENR 6/13.

STREETS AND ROADS

Construction Reports received since this section went to press will be found in Last Minute Construction Reports.

BIDS ASKED

Bids Asked July 8

Minn., Alexandria—Douglas Co., P. L. Hintzen, aud., and State Hy. Dpt., St. Paul, grading 5.4 mi. between 1 mi. north of County Aid Road 26 at Lake Carlos and C. A. R. 5, 161, 585 cu. yd. excav., S. P. 21-509-02 (SAR 20), Minn., Proj. S-158 (1), Plans deposit $1.45; grading 3.4 mi. between Trunk Hy. 52 and McKay Ave. in Alexandria and S. A. R. 9, 121,038 cu. yd. excav. Plans deposit $1.25. O. L. Kipp, St. Paul, ch. engr. CD 3/14/45—ENR 4/5/45.

Bids Asked July 8

Minn., Windom—Cottonwood Co., E. J. Carbine, aud., and State Hy. Dpt., St. Paul, grading, graveling 3 mi. between south limits Storden and 3 mi. south, S. P. 17-504-01 (S. A. R. 5), Minn. Proj. S-183. Plans deposit $1.25; 4.99 mi. S. P. 17-506-02, (S. A. R. 5), Minn., Proj. 900 (2). Plans deposit 90c. O. L. Kipp, St. Paul, ch. engr.

Bids Asked July 9

Minn., Grand Rapids—R. J. Whaling, aud., Itasca Co., and State Hy. Dpt., St. Paul, grading between Trunk Hys. 2 and 6, 118,428 cu. yd. excav., and Bridge No. 6605, three 20-ft. creosoted timber spans, 24 ft., roadway, treated timber 24.99 M. B. M. and 1,000 lin. ft. treated timber piling S. P. 31-502-02 (SAR 11) Minn. Proj. S-217 (1). Plans deposit $1.45. O. L. Kipp, St. Paul, ch. engr.

Bids Asked July 9

Minn., Waseca—Waseca Co., A. Brisbane, aud., and State Hy. Dpt., St. Paul, grading 5.8 mi. between 4 mi. north of Waldorf and 2 mi. south of Janesville, 100,672 cu. yd. excav. and 6,960 cu. yd. traffic-bound gravel wearing course in place. Plans deposit 90c. O. L. Kipp, St. Paul, ch. engr.

Bids Asked July 10

Louisiana—Dpt. Hys., D. Y. Smith, dir., Baton Rouge, sand clay gravel base course, bituminous mixture for cold application, and 2 and 3 application bituminous surface treating (asphalt cement), 15.2 mi. Ville Platte-Turkey Creek Hy., State Routes 23 and 218, S.P. 206-01-05, Evangeline Parish; grading, gravel surfacing, concrete scale pit, frame scale house, etc. 0.114 mi. Monroe-Rayville Hy., State Route 4, S.P. 2-01-08, Ouachita Parish; 0.114 mi. New Orleans-Rigolets Hy., State Rte. 2, S.P. 6-04-21, Orleans Parish; sand clay gravel base course, bituminous mixture for cold application and 2 and 3 application bituminous surface treating 12.1 mi. Rayne-Lawtell Hy., State Rtes. 40 and 212, S.P. 207-07-06 and 207-08-04, Acadia Parish, all foregoing CD 5/23—ENR 5/30; 2 and 3 applica-

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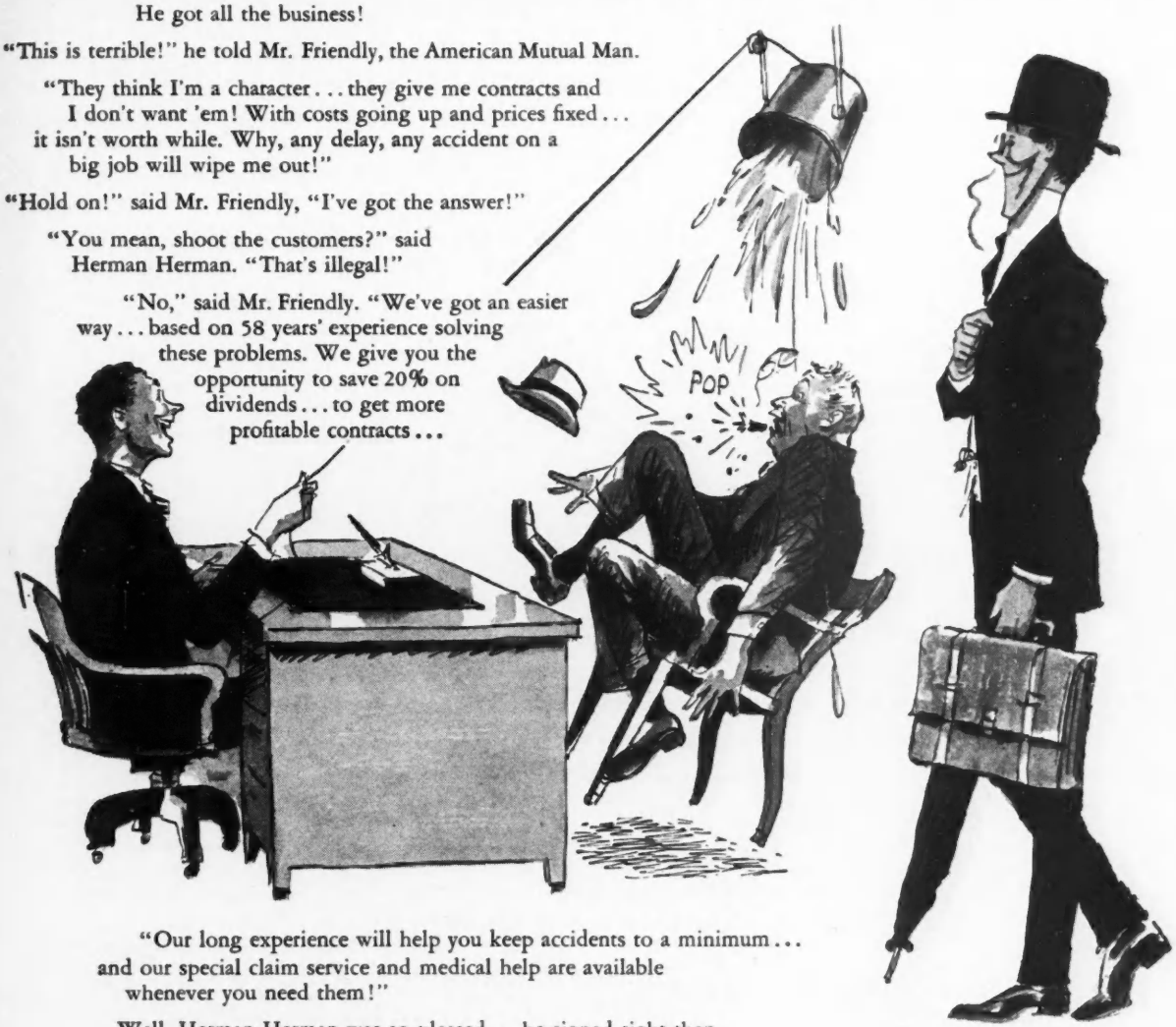

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STREETS AND ROADS (Bids Asked, Cont'd.)

tion bituminous surface treating, etc. 15.2 mi. Bunkie-Marksville Hy., State Route 5, S.P. 33-01-07, Avoyelles Parish; bituminous surface treating, sand clay gravel base course, 4 mi. Bayou Cocodrie-Meeker Hy., State Rte. 26, S.P. 57-08-05, Rapides Parish; sand clay gravel base course, bituminous mixture for cold application and 2 and 3 application bituminous surface treating 16.8 mi. Pine Prairie-Bayou Cocodrie Hy., State Rte. 26, S.P. 57-06-08 and 57-07-04, Evangeline Parish, all foregoing CD 6/13—ENR 6/20, under LB; grading, drainage structures, 3 application bituminous surface treating 2.254 mi. Colfax-Pollock Hy., State Rte. 19, S.P. 40-01-08, Grant Parish; shaping roadway, gravel surfacing, drainage structures 64.9 mi. Maneuver Area Rds., Group 12, Sects. 6, 7, 9, 11, 12 and 13, on State Routes 143, 249, 285 and 287, S.P. 737-00-17, Contr. 3, Beauregard and Calcasieu Parishes; shaping, gravel surfacing, drainage structures 61.58 mi. Maneuver Area Roads, Group 13, Sects. 6, 8, 9, 11, 14, 15, 16, 17, 18 and 19, State Routes 22, 113, 151, 251, 252, 498, 1058 and C-1656, S. P. 737-00-18, Contr. 4, Beauregard and Allen Parishes.

Bids Asked July 12

Pennsylvania—State Hy. Dpt. Harrisburg, widening pavement with rein.-con. 9,921 ft., and exten. 2 rein.-con. bridges, L.R. 203 (R-1), T.R. 66, from Manorville Boro south toward Ford City Boro, Armstrong Co.; rein.-con. paving 6,306 ft., incl. 1 rein.-con. structure, bituminous on crushed aggregate surfacing, miscellaneous drainage, and repairing bridge, L.R. 61, Sec. R-1, L.R. 59 (R-2), T.R. 28 and 219, Brockway Boro, Jefferson Co.; rein.-con. paving 2,468 ft., incl. rein.-con. structure and 1 rein.-con. retaining wall, 1 rein.-con., steel viaduct and rein.-con. bridge, L.R. 168 (11-B), T.R. 611, between Moscow Boro and Dunmore, Elmhurst Twp., Lackawanna Co.; bituminous surfacing 4,426 ft., Island Ave., between Eastwick and Buist Aves., L.R. 67053 (3), Philadelphia Co.; bituminous on native stone or crushed aggregate surfacing 18,097 ft., and 1 rein.-con. bridge, L.R. 286 (16) L.R. 880 (1), T.R. 36 and 866, from Woodbury Boro northerly to point beyond Blair-Bedford Co. line, Bedford and Blair Counties; bituminous on crushed aggregate surfacing 3,898 ft., L.R. 03075 (R-1), between Oakland and Putneyville, Mahoning Twp., Armstrong Co.; widening pavement with native stone or crushed aggregate base and bituminous surfacing 3,884 ft., L.R. 236 (7) T.R. 44, Shinglehouse Boro, Potter Co.; bituminous on crushed stone surfacing 8,152 ft., ft., L.R. 161, L.R. 290 Spur, T.R. 345 and 142, Gilberton Boro, Schuylkill Co.; bituminous on concrete surfacing 1,633 ft., and paving railroad crossing, L.R. 175 (15-A), T.R. 987, between Bath Boro and Franks Corner, East Allen Twp., Northampton Co.; bituminous on native stone Type A or crushed aggregate surfacing, rein.-con. bridge, L.R. 109 (3), T.R. 18 from North Franklin Twp., city of Washington Line, southerly to point 8 mi. from Properity, N. Franklin Twp., Washington Co.; rein.-con. wearing surface for bridge floor, 1,349 ft. Market St. Bridge in Wilkes-Barre City, Kingston Boro, Luzerne Co. Plans deposit $2.50 each. T. C. Frame, ch. engr.

Bids Asked July 16

Del., Wilmington—New Castle Co., Wilmington, imprv. Lancaster Village, Contr. SD-1, Delaire, Contr. SD-2, Greenhill, SD-3. J. L. Cahalan, co. engr.; adv. ENR 6/27.

Bids Asked July 17

California—Div. Hys., Sacramento, grading, plant mix on crusher run surfacing 2.7 mi. A St. and Redwood Rd. between San Lorenzo Creek Bridge and Proctor Rd., Alameda Co. G. T. McCoy, Sacramento, engr.

†**Virginia**—Pub. Roads Admin., 1440 Columbia Pike, Arlington, constructing Proj. 1-B3, C2-D3, Blue Ridge Parkway, Nelson and Augusta Counties. Plans deposit $10; adv. ENR 6/27.

Bids Asked July 23

Ala., Birmingham—Comrs. Jefferson Co., paving 2 mi. New Castle-Gardendale Rd., surfacing 12 Ave., Fairfield and Highland Sts.

BIDS ASKED

★**California**—State Div. Hys., Sacramento, June 19, imprv. 3 mi. Monterey Co., from N. M. Ball Sons, Box 430, Berkeley, **$470,027** ***0.6 mi. Del Norte Co., from J. Burman & Sons, 2404 F St., Eureka, **$102,005.** CD 6/3—ENR 6/6;***0.9 mi. at Hollister Wye, Santa Barbara Co., from J. S. Smith, 444 E. Ross St., Glendale, **$152,166.** CD 5/24—ENR 5/30.

Calif., Hillsborough—City, City Hall, June 17, imprv. Virginia Ave., Wildwood Dr., Melrose Court and Glenbrook Dr., from Pioneer Constr. Co., Box 411, San Mateo. **$113,744.**

†**Calif., Oakland**—Yards & Docks Annex, Navy Dpt., Arlington, Va., June 18, reconstructing streets at Naval Supply Depot. Spec. 17926, from L. J. Immel, Box 65, Sta. A, Berkeley. **$268,418.** CD 6/6.

Calif., San Francisco—Pub. Utilities Comn., City Hall, June 18, repaving street, sidewalk openings where paving has been removed for San Francisco Water Dpt., Spec. 430, from Pacific Pavements Co., Ltd., 85 Barstow St., **$49,995.**

Calif., San Francisco—Dpt. P. Wks., City Hall, June 19, imprv. Guerrero St. between 14 and Army Sts., Spec. 19.921, from Eaton & Smith, 715 Ocean Ave. **$206,221.** CD 6/5.

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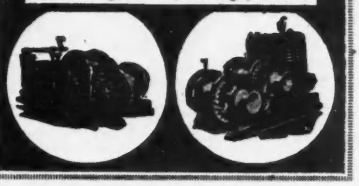

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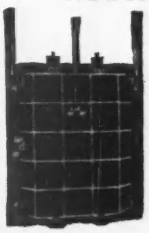

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STREETS AND ROADS (Low Bidders, Cont.)

Connecticut—State Hy. Comn., Hartford, rejected bids May 27, imprv. Dump Rd. and Fox Rd., Putnam, L.B. **$28,030**; Purchase Brook Rd., Southbury, L.B. **$76,270**; Gallows Hill and Starrs Plain Rds., Redding, L.B. **$66,223.** CD 5/31—ENR 6/6.

Connecticut—State, W. J. Cox, comr., Hartford, June 17, imprv. 6,778 ft. Lordship Meadow Rd., Stratford, from P. Tarinelli, 144 Island Brook Ave., Bridgeport, **$40,417***** 19,309 ft. Waterman, Goshen, Village Hill, Church and Colchester Rds., Lebanon from D. Cosgrave, Todds Hill Rd., Branford, **$59,750** ***12,445 ft. Town Line and Weeds Rds., Torrington, from S. V. Rossi Constr. Co., McDermott Ave., Torrington, **$61,169*****22,233 ft. Merrow Goose Lane and Cassidy Hill Rd., Coventry, from F. Palazzi & Sons, Inc., 2321 Hartford Ave., Johnsonton, R. I., **$66,793***** 8,321 ft. Grassy Hill and Ely Ferry Rds., Lyme, from Maus-Williams Co., East Haddam, **$46,691.** CD 6/6—ENR 6/13.

Georgia—State Hy. Dpt., G. T. McDonald, dir., Atlanta, June 14, from Claussen-Lawrence Const. Co., Augusta, and Hugh McMath Constr. Co., Brennan Rd., Columbus, grading, concrete paving 6.985 mi. Quitman-Valdosta Rd., Brooks and Lowndes Counties, **$398,123*****from S. J. Alexander, Inc., Thomasville, reconstructing, widening, surfacing 9.508 mi. Waycross-Baxley Rd., Bacon Co., **$287,690** ***from Crummey & Crummey, Rochelle, surface treating 4.999 mi. Odum-Screven Rd., Wayne Co., **$37,104**; grading, surface treating 6.018 mi. Reidsville-Collinsville Rd., Tattnall Co., **$80,108**; grading, base and surface treating, bridging 7.997 mi. Albany-Cordele Rd., Dougherty and Worth Counties, **$129,456***** from John Monaghan, Inc., Pelham, grading, paving 11.536 mi. St. George-Moniac Rd., Charlton Co., **$184,762*****from Henry Newton & Co., Decatur, grading, surface treating, 2 bridges, 7.458 mi. Manchester-Woodbury Rd., Meriwether Co., **$175,637*****from Ledbetter-Johnson, Contractors, Rome, base and surface treating 1.587 mi. Elderton-Washington Rd., Wilkes Co., **$95,641*****from W. L. Cobb, Inc., Decatur, grading, base, surface treating, bridging 1.623 mi. Commerce-Carnesville Rd., Franklin Co., **$104,183*****from Shinall & Tato, Cartersville, grading, base, surface treating 8.964 mi. Calhoun-Fairmount Rd., Gordon Co., **$89,408*****from H. Brown, Milledgeville, grading, base 2.953 mi. Crawfordsville-Washington Rd., Taliaferro Co., **$44,025**; grading, base, 2 bridges 6.416 mi. Eatonton-Sparta Rd., Putnam Co.; **$163,111*****from Espy Paving & Const. Co., 108 E. Bay St., Savannah, grading, base, surface treating 3.906 mi. Montieth-State Rt. 167 Rd., Chatham Co., **$49,838.**

Ga., Marietta—Cobb Co., June 12, grading, paving 8.45 mi. Sandy Plains Rd., from Ledbetter-Johnson, Rome. **$85,968.** CD 5/20—ENR 5/23.

Illinois—State Div. Hys., Springfield, rejected bids May 17, imprv. hys., Douglas, Edgar, Champaign, Coles, Moultrie, and Piatt Counties, L.B. **$127,313*****Effingham, Jasper and Crawford Counties, L.B. **$125,313*****Jefferson, Hamilton and Franklin Counties, L.B. **$136,246*****Marion, Jefferson, Fayette, Washington, Clay and Clinton Counties, L.B. **$156,-684*****Randolph Co., L.B. **$100,555*****Saline, Gallatin, Massac and Williamson Counties, L.B. **$106,889.** CD 5/22—ENR 5/30 under LB.

★**Illinois**—State Div. Hys., Springfield, June 14, imprv. 3.79 mi. S.B.I. Rte. 57, from Arcole-Midwest Corp., 221 N. La Salle St., Chicago, **$136,941*****6.48 mi. S.B.I. Rte. 49, from Gallagher Asphalt Co., P.O. Box 173, Thornton, **$231,284**, both Cook Co.***8.19 mi. Du Page Co., from Black Top Roads Co., 1929 N. Narragansett Ave., Chicago, **$191,484***** 1.95 mi. Lake Co., from Peter Baker & Son Co., 490 Conway Rd., Lake Forest, **$72,821*****1.01 mi. Madison Co., from Edwardsville Const. Co., 309-310 Bank of Edwardsville Bldg., Edwardsville, **$167,773*****3.64 mi. McLean Co., from Berenz & Son, 500 E. Bell St., Bloomington, **$64,957*****7.9 mi. Moultrie Co., from I. D. Lain Co., 500 E. Capitol Ave., Springfield, **$157,933** ***7.16 mi., White and Gallatin Counties, from Granite Bituminous Paving Co., 3942 Duncan St., St. Louis, Mo., **$141,663.** CD 6/7.

Ill., Chicago—City, Dpt. P. Wks., City Hall, June 17, bituminous concrete paving N. California Ave. from W. North to N. Milwaukee Sts., from Graham Paving & Constr. Co., 30 N. La Salle St. **$186,895.** CD 6/12.

Indiana—State Hy. Comn., J. H. Lauer, chn., Indianapolis, June 18, imprv. 5.541 mi. La Porte Co., Contr. R-2706, from Gast Constr. Co., Warsaw, **$241,179.** Est. $246,221. Rejected bids June 18, imprv. 4.211 mi. Vanderburgh Co., 3.988 mi. Greene Co.; 2.785 mi. Monroe Co.; 4.36 mi. Vigo Co. CD 6/7—ENR 6/13.

Iowa—State Hy. Comn., Ames, rejected bids June 11, imprv. hy. Appanoose Co., L.B. **$5,957**; hys. in State Park (3 separate jobs) L.B. **$48,627, $16,204** and **$30,128** respectively. CD 6/4—ENR 6/6.

Kentucky—Dpt. Hys., Frankford, rejected bids May 31, imprv. hys. MP and SP Group 5 (1946) Barren Co., L.B. **$34,408**; S.P. Group 23 (1946) Rockcastle Co., L.B., **$31,074.** CD 5/15 —ENR 5/23.

Kentucky—State Dpt. Hys., Frankfort, June 14, imprv. 34.6 mi. Kenton Co., from Bergin & Wright Co., Covington, **$47,481*****6.404 mi. Jefferson Co., from Jefferson Const. Co. Inc., Crittenden Dr., Louisville, **$97,273*****8.835 mi. Hardin and Larue Counties and 11.166 mi. Davies and Ohio Counties, from R. B. Tyler Co., 1446 Levering St., Louisville, **$54,330** and **$302,138** respectively***10.682 mi. Henderson and Webster Counties, from R. E. Mills, 410 Ann St., Frankfort, **$310,133*****23.37 mi. Breathitt and Owsley Counties, from Kentucky Road Oiling Co., Frankfort, **$210,347.** CD 5/28—ENR 5/30.

Louisiana—Dpt. Hys., D. Y. Smith, dir., Baton Rouge, received no bids June 12, imprv. 2.5 mi. hy. Lincoln Parish; 1.71 mi. Natchitoches Parish; 2 mi. Caldwell Parish; 2.55 mi. St. Landry Parish; 5.1 mi. West Carroll Parish; 13.96 mi. St. Tammany Parish; 11.3 mi. Catahoula Parish; 22.23 mi. Tangipahoa and Washington Parishes. CD 5/29—ENR 6/6.

Maine—State Hy. Comn., Augusta, June 19, imprv. 2.52 mi. Sandy Bay Twp., from Ford & Smiley, Skowhegan, **$192,952**; 2.1 mi. Johnson Mountain Twp., from H. Sargent, Stillwater, **$91,048.** CD 1/10—ENR 1/13.

Maine—State Hy. Comn., Austin, rejected bids May 29 imprv. 3.9 mi. Augusta, L. B. **$385,180.** Will readvertise. CD 6/6—ENR 6/13, under LB.

Minn., St. Cloud—Stearn Co., F. Rambler, aud., and State Hy. Dpt., St. Paul, rejected bids June 5 imprv. 9.3 mi. between Sartell and 9.3 mi. north, S.P. 73-503-04 (SAR 1), Minn., Proj. S (1). L.B. **$73,634.** CD 5/20—ENR 5/23.

†**Mississippi**—U. S. Eng., P. O. Box 60, Vicksburg, June 6, constructing access road to Sardis Dam, Panola Co., from Pioneer Contracting Co. Inc., 453 Plum Ave., Memphis, Tenn. **$130,294.** CD 5/15—ENR 5/23.

Mo., Louisiana—City, rejected bids June 7, concrete paving about 3.766 mi. streets. **$129,182.** Will readvertise. Walther & Vandergriff, Realty Bldg., Farmington, engrs. CD 5/21—ENR 5/23.

Tenn., Memphis—City, City Hall, repaving 3,000 ft., Vernon Rd., from Jackson to Homer Sts., from W. L. Sharpe Co., Col. Tr. Bldg., **$45,286.** CD 6/1/43—ENR 6/3/43.

Ohio—State Hy. Dpt., Columbus, rejected bids June 11, imprv. 1.527 mi. Hamilton Co. L.B. **$46,480.** CD 6/3—ENR 6/6.

†**Oregon**—Pub. Roads Admin., Bedell Bldg., Portland, received no bids June 11, surfacing and bituminous surfacing 5.285 mi. John Day Highway, Whitman National Forest, Grant Co. W. H. Lynch, div. engr. CD 5/31.

★**Pennsylvania**—State Dpt. Hys., Harrisburg, rejected bids May 17, imprv. 10,478 ft., Mifflin Co. L.B. **$693,404.** CD 5/21—ENR 5/23, under LB.

Pa., Pittsburgh—Allegheny Co., Dpt. P. Wks., County Office Bldg., June 11, reconstructing Steuben St., etc., from Ben Constr. Co., 101 Hargrove St. **$176,861.** Est. $150,000. CD 5/28—ENR 6/6.

Vermont—State Hy. Dpt., Montpelier, rejected bids June 14, imprv. 1.064 mi. Rupert-West Pawlet Rd., in Rupert. L.B. **$49,109.** Will readvertise. CD 6/6—ENR 6/13.

West Virginia—State Rd. Comn., Charleston, June 11, imprv. 0.769 mi. Boone Co., from Haynes Constr. Co., South Charleston. **$143,-832.** CD 6/4—ENR 6/6.

Wis., Kaukauna—City, City Hall, K. Marzohl, clk., June 10, asphalt surfacing streets, from Badger Hwy. Co., Oshkosh. **$55,700.** CD 6/4—ENR 6/6.

British Columbia—Province of British Columbia, Parliament Bldgs., Victoria, Apr. 5, bituminous surfacing hys., Kootenay Electoral Dist., from Dawson, Wade & Co., Ltd., 775 Clark Dr., Vancouver. **$52,425.**

CONTRACTS AWARDED

California—State Div. Hys., Sacramento, imprv. 3.4 mi. between Antioch bridge and Emmaton, Sacramento Co., to Sheldon Oil Co., Main St., Suisun. **$39,990.** Bids 6/5. CD 5/20 —ENR 5/23.

Calif., San Bruno—City, City Hall, streets, sidewalks, curbs, gutters, storm and sanitary sewers, etc., Mill Park 3 sub-division, to Union Paving Co., 212 Babcock Bldg., San Francisco. **$91,991.** Bids 6/12.

Minnesota—State Hy. Dpt., St. Paul, bituminous seal coat in Group No. 2, Maintenance Dists. 9 and 11, to Ashworth-Hawkinson Co., 3601 Alabama Ave., St. Louis Park, **$52,044**; in Group 3, Maintenance Dists. 12, 13, 14, 15 and 16, to Alexander Constr. Co., 4641 Hiawatha Ave., Minneapolis. **$40,948.** Bids 6/7. CD 5/28.

Minn., Blue Earth—Faribault Co., G. G. Buscho, aud., and State Hy. Dpt., St. Paul, imprv. 5.4 mi. road between Bricely and Trunk Hy. 22, in Keister, to Hodgman & Larimore, Grenada. **$44,650.** Bids 6/3. CD 5/17—ENR 5/23.

Minn., Long Prairie—Todd Co., N. Truog, aud., and State Hy. Dpt., St. Paul, imprv. 12.5 mi. road between Browerville and CAR B, 233,823 cu. yd., to R. B. Fraser Constr. Co., Northfield. **$68,960.** Bids 6/3. CD 5/17—ENR 5/23.

Minn., St. Cloud—Stearns Co., F. Rambler, aud., and State Hy. Dpt., St. Paul, imprv. 7.2 mi. S.P. 73-506-02 (SAR 9, Proj. S-256 (1), to Johnson Constr. Co., Litchfield. **$43,-756.** CD 5/20—ENR 5/23.

★**Ohio**—State Hy. Dpt., Columbus, to [illegible] State Asphalt Corp., South Bway., Marietta Ferry, imprv. 2.952 mi. Jefferson Co., **$60,[illegible]**, est. $55,000, 5.201 mi. Harrison Co., **$64,[illegible]**, est. $65,290, 2.299 mi. Guernsey Co., **$50,[illegible]**, est. $52,080***to Launder & Son, Inc., Sta. [illegible] Box 6, Toledo, 4.277 mi. Sandusky Co., **$55[illegible]** 519, est. $602,000***to W. A. Gurtler & [illegible] Reynoldsburg, Cuyahoga Co., **$98,076**, [illegible] $130,930***to Elmer O. Vogt Paving Co., [illegible] Wellman Ave., Massillon, 3.419 mi. Wayne Co., **$389,272**, est. $385,700***to V. N. Holderman & Sons, 297 S. High St., Columbus, 2.141 mi. Stark Co., **$257,097**, est. $270,000***to Churchill Constr. Co., 1126 State St., Lima, 2.562 mi. Van Wert Co., **$41,375**, est. $42,380***to The McCourt Constr. Co., 720 Home Ave., Akron, 5.156 mi. Portage Co., **$67,417**, est. $68,930*** to Paul Varga & Sons Co., 1385 Norton Rd., Columbus, 29.54 mi. Monroe Co., **$64,255**, est. $64,737***to C. J. Uible, New Vienna, 30.5 mi. Highland Co., **$42,899**, est. $47,697. Grand total $1,694,923. Bids 6/11. CD 6/2—ENR 6/6.

Tex., Houston—T. B. Hubbard Constr. Co., 1507 Delano St., constructing and paving streets. Owner builds. **$45,000.**

★**West Virginia**—State Rd. Comn., Charleston, imprv. 9.332 mi. Wyoming Co., to Vecellio & Grogan, Beckley. **$847,288.** Bids 6/11. CD 6/4—ENR 6/6.

★**Wisconsin** — State Hy. Comn., Madison, imprv. 15.912 mi. Barron and Rusk Counties, to Wm. L. Kimmes, 1530 John Ave., Superior. **$511,432.** CD 5/31—ENR 6/6, under LB.

†**C. Z., Coco Solo**—Yards & Docks Annex, Navy Dpt., Arlington, Va., road repairs, Naval Magazines, NOY 13467, to Pan Pacific Constr. Corp., Box E, Pedro Miguel. **$65,000.** CD 5/3 —ENR 5/9.

EARTHWORK, WATERWAYS

Construction Reports received since this section went to press will be found in Last Minute Construction Reports.

BIDS ASKED

Bids Asked July 1

†**N. J., Hoboken**—War Shipping Admin., Dpt. Commerce Bldg., Wash. 25, D. C., demolition, removal piles and dredging.

Bids Asked July 2

Mass., East Boston—Commonwealth of Massachusetts, Dpt. P. Wks., 100 Nashua St., Boston, excav. approx. 600,000 cu. yd. ordinary borrow from Governors Island and placing material as filling at hangar sites of General Edward Lawrence Logan Airport. Plans deposit $2.

†**Virginia**—U. S. Eng., Fort Norfolk, recording gage shelter, Roanoke River-Buggs Island, Mecklenburg Co., Inv. No. 44-110-46-75, Ser. 456.

†**Wisconsin**—U. S. Eng., 428 **Federal Bldg.**, Milwaukee, Zone 1, dredging approx. 115,000 cu. yd. scow measurement, materials to remove shoals from portions of outer and inner channels at Green Bay Harbor, Serial No. 47-013-46-152.

Bids Asked July 3

†**Iowa**—U. S. Eng., Clock Tower Bldg., Rock Island, Ill., emergency repairs to Estle levee along left bank of Cedar River, Muscatine Co.

La., Tallulah—Police Jury of Madison Parish, Tallulah, imprv. 8 mi. Mothligam Bayou, 600,000 cu. yd. excav., Madison Parish.

N. B., Caissies Cove—Dpt. P. Wks., Hunter Bldg., Ottawa, Ont., breakwater. $50,000. K. M. Cameron, c/o owner, engr. CD 4/8—ENR 4/18.

Bids Asked July 8

★**Arizona-California-Nevada** — Bureau Reclamation, Federal Bldg., Yuma, Ariz., earthwork, canal lining, structures, Sta. 6267 plus 10 to Sta. 6517 plus 00, Coachella Canal, All-American Canal Sys., Boulder Canyon Proj., Arizona-Calif.-Nevada, Spec. 1381. Extended date. CD 6/13—ENR 6/20.

Bids Asked July 15

†**Idaho**—Bureau Reclamation, 214 Broadway, Boise, earthwork, structures, C line east canal laterals 1.7 to 7.7-1.9 and Conway Gulch lateral, from Sta. 2 plus 00 to Sta. 60 plus 50, and sublaterals, Payette Div., 8 mi. north of Caldwell, Boise Proj. Spec. 1390.

†**Oregon**—Bureau Reclamation, Bend, earthwork and structures, Laterals M-45, M-48, M-49, M-50, M-51, M-51A, M-51B, M-52, M-53-A, M-53B, M-54, M-55, M-56, M-56A and sublaterals, Deschutes Proj., in vicinity of Madras, and 7 mi. south thereof.

Bids Asked July 16

†**Arizona** — Bureau Reclamation, Yuma, earthwork, concrete lining, structures B-3.7 wasteway, Sta. 0 plus 00 to sta. 112 plus 50, Unit 1, Yuma Mesa Div., Gilda Proj., Spec. 1388.

†**Arizona-Nevada-California**—Bureau Reclamation, Yuma, Ariz., earthwork, land leveling East Mesa Predevelopment, East Mesa Div., All-American Canal Sys., 44 mi. west of Yuma, Boulder Canyon Proj., Spec. 1392.

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EARTHWORK, WATERWAYS (Bids Asked, Cont'd.)

†**Missouri, Iowa and Nebraska**—U. S. Eng., 1709 Jackson St., Omaha, Neb., about 2,540 lin. ft. revetment in or immediately adjacent to Missouri River at Black Bird-Decatur Bends, Monona Co. Iowa and Thurston and Burt Counties, Nebraska, between Mile 752 and Mile 742 (1890 Mileage) the center of the work being 747 mi. above mouth (1890 Mileage) and about 3 mi. upstream from Decatur Neb., Spec. 25-066-46-442.

★†**South Dakota**—U. S. Eng., Fort Peck, Mont., imprv. Fall River Channel, Hot Springs, Ser. No. 24-016-46-46. CD 6/13—ENR 6/20.

Bids Asked July 17

†**California**—Bureau Reclamation, Denver, furnishing, del. f.o.b. cars at shipping point or f.o.b. cars at Coram, 3 jet pumps, for Units 1, 2, and 5 at Shasta Power plant, Central Valley Proj., Spec. 1387.

Bids Asked July 22

†**Washington**—Bureau Reclamation, Custom House, Denver, Colo., one gantry crane with 70 ton capacity, having auxiliary trolley with 20 ton capacity, for purpose of assembling and installing reverse-flow, coaster gates in Grand Coulee Pump. Plant, Columbia Basin Proj., Spec. 1391.

†**Wyoming**—Bureau Reclamation, Thermopolis, constructing Anchor Dam on south fork of Owl Creek, 33 mi. west of Thermopolis. CD 9/6—ENR 9/20.

Bids Asked in July

New Jersey—Dpt. Conservation, Div. Navigation, 1060 Broad St., Newark, Zone 2, new channel addn. to State Inland Waterway Sys. in Barnegat Bay, vicinity Seaside Heights. $160,000 appropriated.

LOW BIDDERS

Calif., Malibu—The Malibu Quarterdeck Imprvt Co., c/o E. D. Turner, Beverly-Wilshire Hotel, Beverly Hills, June 13, 2,400 lin. ft. concrete pile bulkhead and sea wall for yacht harbor at Malibu Creek Inlet, from Shannahan Bros., 6193 Maywood Ave., Huntington Park. **$140,000.**

†**Calif., Stockton**—Yards & Docks Annex, Navy Dpt., Arlington, Va., June 18, berthing inactive vessels involving berthing facilities. Spec. 17842, from B. C. Gerwick Inc., 112 Market St., San Francisco. **$331,050.** CD 6/6, under Unclassified.

★†**Colorado**—U. S. Eng., 909 17 St., Denver, Zone 2, June 18, excav. and backfill for cutoff, stream diversion and care of water, appurtenant work for Cherry Creek Dam, Arapahoe Co., Serial 04-016-46-17, from Bressi & Bevanda Constructors, Inc., 417 S. Hill St., Los Angeles, Calif. and D. G. Gordon Constr. Co., 1900 31 St., Denver. **$1,381,425.** CD 5/31—ENR 6/6.

†**Illinois**—U. S. Eng., 816 U. S. Court House and Custom House, 1114 Market St., St. Louis, 1, Mo., June 12, four gravity drainage structures in levees of Clear Creek Drainage and Levee Dist., Union and Alexander Counties, from J. L. Pohl, Nevada, Mo., **$66,359.** CD 6/4—ENR 6/6.

†**Iowa**—U. S. Eng., Clock Tower Bldg., Rock Island, Ill., indefinitely postponed bids to have been opened July 9, constructing upper approach imprvs., guide wall exten., for Lock and Dam 16, near Muscatine, and Lock and Dam 18, near Burlington on left bank Mississippi River. CD 6/13—ENR 6/20.

★†**Mass., West Springfield**—U. S. Eng., 19 Industrial Trust Bldg., Providence, 2, R. I., rejected bids May 16, Riverdale dike, 12,900 ft. long, 3 stop log structure, drainage sys. **$589,972.** CD 5/21—ENR 5/23, under LB.

†**Montana**—Bureau Reclamation, Terry, June 17, Fallon pump. plant, Fallon Relift Pump. Plant, canals, laterals and sublaterals, Second Div., Buffalo Rapids Proj., Spec. 1348, from M. G. Long, Billings, **$256,633.** CD 1/11.

★†**Nebraska**—U. S. Eng., 401 Davidson Bldg., Kansas City, Mo., June 14, earth dam embankment Right Bank-First State for Harlan Co. Dam, Ser. 23-035-46-177, from Mark C. Walker & Son Co., Santa Clara, Calif. **$1,052,510.** CD 5/20—ENR 5/23.

★†**N. Y., Canisteo**—U. S. Eng., Chimes Bldg., Syracuse, June 18, flood control project, along right bank Canisteo River and Purdy and Bennett Creeks, Inv. No. 30-180-46-19, from D. W. Winkelman Co., Heffernan Bldg., Syracuse, **$671,096.** CD 5/16—ENR 5/23.

★†**Pa., Williamsport**—U. S. Eng., Chimes Bldg., Syracuse 2, N. Y., June 17, Williamsport Flood Protection Proj., Levee 3, Inv. 30-180-46-10, from G. M. Brewster & Son, Inc., 275 Ft. Lee Rd., Bogota, N. J. **$1,220,067.** Est. $1,154,525. CD 5/17—ENR 5/23.

†**Tennessee**—U. S. Eng., P.O. Box 97, Memphis, June 17, Sect. 3, Wolf River Floodwall, Ser. No. 40-041-46-58, from Ottinger Bros. Constr. Co., 370 N. May St., Oklahoma City, Okla. **$300,541.** CD 5/29—ENR 6/6.

†**Tex., Fort Worth**—U. S. Eng. P.O. Box 61, Wright Bldg., Tulsa 2, Okla., army air field drainage facilities, from Texas Bitulithic Co., 111 Commerce St., Dallas. **$27,887.** CD 6/4.

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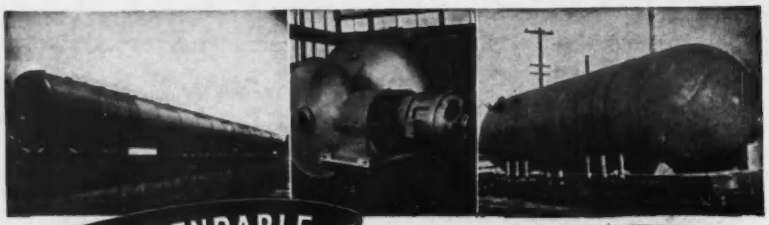

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EARTHWORK, WATERWAYS (Contracts Awarded, Cont'd.)

CONTRACTS AWARDED

†**Arizona**—Bureau Reclamation, Denver Colo., 5 fixed wheel gates for penstock structure of Davis Dam, Colorado River, near Kingman, to American Bridge Co., Frick Bldg. Pittsburgh, Pa., **$169,305**; hydraulic gate hoists, to McKiernan-Terry Corp., 313 Manor Ave., Harrison, N. J. **$138,026**. CD 4/15—ENR 4/18.

★†**California**—Bureau Reclamation, Friant, earthwork, concrete lining, structures Friant-Kern Canal, Sta. 1647 plus 75 to Sta. 3876 plus 00, Friant Div., Central Valley Proj., Spec. 1204, (Schedule 2), to Morrison-Knudsen Co., 111 Sutter St., San Francisco, and M. H. Hasler, Box 387, Santa Ana. **$1,820,457**. CD 4/16—ENR 4/18, under LB.

★†**California**—Bureau Reclamation, Friant, earthwork, canal lining, structures, King River wasteway and Kings River siphon, Sta. 1591 plus 66.15 to Sta. 1647 plus 75, Friant-Kern Canal, Friant Div., Central Valley Proj., Spec. 1181, to Morrison-Knudsen Co., Inc., 111 Sutter St., San Francisco, and M. H. Hasler, Box 387, Santa Ana. **$1,514,975**. CD 4/16—ENR 4/18, under LB.

†**Michigan**—U. S. Eng., Engineer Bldg., Canal Park, Duluth, 1, Minn., steel pile, concrete breakwater pierheads on east and west breakwaters at Upper Entrance to Keweenaw Waterway, incl. removing parts timber crib concrete and rock pierheads and replacing rock around new and part of existing structure, Inv. 21-001-46-15, to Union Constr. Co., 611 Old Colony Bldg., Des Moines, Ia. **$67,611**. CD 4/24—ENR 5/2.

Missouri—Little River Drainage Dist., 407-413 Himmelberger-Harrison Bldg., Cape Girardeau, cleaning out about 5.5 mi. Ditch 60, involving 100,000 cu. yd., to McAlister Constr. Co., 401 National Bldg., **13.98c.** per cu. yd. Est. $92,000. (**Correction**—contractor and price). CD 6/17—ENR 6/20, under CA.

★†**New York** — U. S. Eng., 960 Ellicott Square Bldg., Buffalo, Zone 3, dredging Lake Erie Entrance to Black Rock Canal, and Black Rock Canal, Niagara River portion of Black Rock Channel, to **Great Lakes** Dredge & Docks Co., 36 Niagara St., Buffalo, Zone 2. **$1,721,340**. CD 5/9—ENR 5/31, under LB.

†**Tex., Matagorda**—U. S. Eng., Santa Fe Bldg., Galveston, steel pile guide walls for Intracoastal Waterway floodgates project, to Marine Constr. Co., Box 107, West Columbia. **$162,717**.

Tex., Mercedes—Southmost Soil Conservation Dist., c/o J. D. Ward, Mercedes, soil conservation project, revetments, grading, ditching, etc. Owner builds. **$70,000**. CD 2/21—ENR 3/7.

★**Tex., Port Arthur**—City, R. L. Cooper, mayor, seawall work, concrete drain boxes under seawall. Item 14, to Tellepsen Constr. Co., 3900 Clay St., Houston, **$441,718*****pumping station, to O. W. Collins, Port Arthur, **$69,356*****sea wall work, pumping unit, to M. N. Dannenbaum Pump Co., 2421 S. Wayside Dr., Houston, **$80,195*****reshaping levees, to East Texas Const. Co., Port Arthur, **$48,500*****concrete drain boxes, Item 15, to Brown & Root, Inc., Box 3, Houston, **$210,735*****addnl. drainage, incl. laying concrete drainage pipe, inlets to Beaumont Constr. Co., Beaumont, **$159,705*****addnl. concrete drains curbing and guttering, to Trottie & Thompson, Port Arthur, **$105,853*****leveling, etc. Items 11 and 12, to Fulton Constr. Co., N. Esperson Bldg., Houston, **$182,471**. Grand total **$1,307,533**. Bids 6/4. CD 5/22—ENR 5/30.

†**Washington**—Bureau Reclamation, Denver, Colo., two 350 ton overhead traveling cranes in Grand Coulee Power Plant, Columbia Basin Proj., to Morgan Engineering Co., Alliance, O. **$264,234**. CD 4/15—ENR 4/18.

PUBLIC BUILDINGS

Construction Reports received since this section went to press will be found in Last Minute Construction Reports.

BIDS ASKED

Bids Asked July 2

N. J., Marlboro—Dpt. Institution & Agencies, Trenton, hospital.

N. J., Tenafly—Bd. Educ., Tenafly, school. $485,000. L. C. Light, 19 Knickerbocker Rd., Englewood, archt. CD 2/15—ENR 2/21.

†**N. Y., New York**—Pub. Bldgs. Admin., 731 Custom House, Zone 4, repairing Vesey St. post office. **FWA.**

Bids Asked July 3

†**N. J., Lakewood**—Pub. Bldgs. Admin., 731 Custom House, New York 4, N. Y., repairing post office. **FWA.**

N. Y., Binghamton—H. A. Cohen, dir. Bureau Contrs. & Accounts, Dpt. P. Wks., The Governor Alfred E. Smith State Office Bldg., Albany, Zone 1, soil explorations and foundation investigations New York State Teachers College; adv. ENR 6/27. CD 7/11—ENR 7/26.

N. Y., Oneonta—H. A. Cohen, dir. Bureau Contrs. & Accounts, Dpt. P. Wks., The Governor Alfred E. Smith State Office Bldg., Albany, soil explorations and foundation investigations New York State Teachers College, adv. ENR 6/27. CD 11/22/44—ENR 12/14/44.

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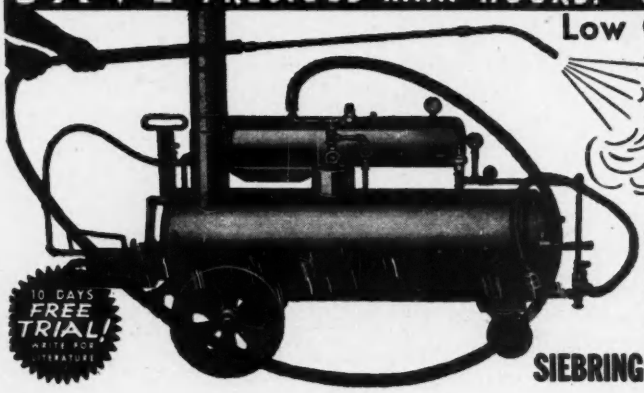

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PUBLIC BLDGS. (Bids Asked, Cont'd.)

Bids Asked July 7

†**N. J., Little Falls**—Pub. Bldgs. Admin., 731 Custom House, New York, Zone 4, repairing post office. **FWA.** CD 11/19—ENR 12/27.

Bids Asked July 8

★**N. Y. Brooklyn**—Supt. School Bldgs., Design & Construction, 49 Flatbush Ave. exten., Zone 1, general construction, plumbing, drainage, heating and ventilating electrical and lighting fixture work, for new address, to P.S. 35 (Decatur Junior High School) Lewis Ave. from Decatur to McDonough Sts. $1,342,000. CD 1/13/44—ENR 1/27/44.

Bids Asked July 9

Minn., Faribault—State, Dpt. Admin., P. T. Peterson, dir., 19 State Capitol, St. Paul, furnishing, installing turbine generator and 1 addnl. generator at State School for Feeble Minded. Bids 5/3, rejected. Pillsbury Engrg. Co., 122 S. 6 St., Minneapolis, engr. CD 4/24—ENR 5/2.

Tex., Galveston—Bd. Trustees of the Public Free Schools, school $370,000. R. R. Rapp, 417 Guaranty Bldg., archt. CD 5/31—ENR 6/13.

†**Mont., Billings**—Bureau Reclamation, Billings, dismantling, moving bldgs., reconstructing residences, constructing garages, streets and sidewalks and water-distr. and sewerage sys., for Government Housing, Missouri River Basin, Spec. 1394.

Bids Asked June 10

Ga., Norman Park—Norman Park Junior College, Norman Park, concrete, steel administration bldg., classrooms, auditorium, library, 2 soundproof studios. C. W. Fulwood, Tifton, archt.

★**Mass., Chelsea**—Commonwealth of Massachusetts, Trustees Soldiers Home, 91 Crest Ave., Boston, 5 story, brick, steel hospital addn., Soldiers Home. $1,000,000. P. Shaw & Hepburn, 958 Park Square Bldg., Boston, archts. CD 3/20—ENR 6/13.

★**N. Y., New York**—New York City Housing Auth., 122 E. 42 St., (1), foundations and general construction combined (2), heating and ventilating (3), electric work (4), plumbing for office bldg., 405-407 E. 42 St. $935,000. CD 12/17—ENR 2/14.

Bids Asked July 11

†**Washington**—Bureau Reclamation, Customhouse, Denver, Colo., aluminum folding doors for service bay RS, aluminum framing members for glass-block windows, Units R1 to R9, inclusive, and service bay RS, in Grand Coulee Power plant, Columbia Basin Proj., Spec. 1361.

Bids Asked July 16

Vt., Brandon—F. P. Free, purch. agt. State Dpt. Welfare, Montpelier, Brandon State School, incl. brick, steel dormitory, school and auditorium, consisting 2 bldgs. Plans deposit $15. Freeman-French-Freeman, 128 Church St., Burlington, archts. CD 10/15/43—ENR 10/21/43.

Bids Asked July 19

†**California**—Bureau Reclamation, Redding, sheet metal work for ventilating sys., Shasta Power Plant, Kennett Div., Central Valley Proj., Spec. 1382.

†**Wyoming**—Bureau Reclamation, Cody, constructing Heart Mountain Power Plant, Shoshone Proj., Spec. 1385.

Bids Asked July 24

†**Montana**—Bureau Reclamation, Denver, Colo., three 2-bedroom and two 3-bedroom prefabricated or precut houses for Tiber Dam Government Camp, Lower Marias Unit, Spec. 1398.

LOW BIDDERS

★†**Calif., Fairfield**—U. S. Eng., 1209 Eighth St., Sacramento 8, June 18, converting BAT barracks, TOQ and EOZ type officers quarters to apartments, Spec. 1235, from Morrison-Knudsen & Stolte Inc., Fairfield. $644,241.

★**Calif., Imola**—Div. Architecture, Pub. Wks. Bldg., Sacramento, rejected bids June 11 constructing Units 1 and 4, South Ward Group, Napa State Hospital. L. B. $1,740,600. CD 6/14—ENR 6/20, under LB.

★†**Calif., Inyokern**—Yards & Docks Annex, Navy Dpt., Arlington, Va., June 19, housing facilities, Spec. 17959, from Johnson, Drake & Piper, Latham Square Bldg., Oakland. $2,498,470. CD 6/5.

Calif., Norwalk—State Div. Architecture, P. Wks. Bldg., rejected bids June 11, 1 story, rein.-con. ward bldg. for infirm men. L.B. $194,640. CD 6/12—ENR 6/20, under LB.

Calif., Spadra—State Div. Architecture, Pub. Wks. Bldg., Sacramento, rejected bids June 11, two 1 story, rein.-con. ward bldgs. at Pacific Colony. CD 6/10—ENR 6/16.

†**Ky., Lexington**—U. S. Eng., P. O. Box 1234, Cincinnati, 1, O., bldg. relocations, hardstandings, railroad spur track, loading ramp, Lexington Signal Depot, Ser. No. 33-015-46-69, from H & F Homes Co., 626 Bway., Cincinnati, 2, O. $111,224. Est. $84,319. CD 6/3—ENR 6/6.

La., Baton Rouge—State Dpt. Finance, 201 Capitol Annex Bldg., June 11, trade school, Reg. D. 26597 G.C. 4, from Caldwell & McCann, Triad Bldg. $328,454. CD 6/23—ENR 5/30.

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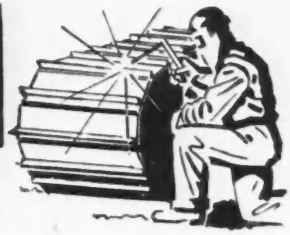

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PUBLIC BLDGS. (Low Bidders, Cont'd.)

★†**Md., Fort George G. Meade—U. S. Eng.,** First and Douglas Sts. N. W., Wash., 25, D. C., June 17, converting barracks into apartments, from C. R. Scrivener Co., 325 St. Paul St., Baltimore. (1) $122,312 (2) $269,000 (3) $378,000 (4) $521,850. CD 6/13.

Mass., Wellesley — Town, Bd. Selectmen, Town Hall, June 12, brick, concrete municipal unit, incl. shops and space to house equip. for Highway, Sewer and Water Dpts., from Tocci Bros. Constr. Co., 58 Colonial Ave., Newton. $208,866. CD 5/29—ENR 6/6.

†**Mont., Columbia Falls**—Bureau Reclamation, Kalispell, May 28, warehouse at Hungry Horse Govt. Camp, Spec. 1326, from Dudley Constr. Co., Great Falls. $91,288. CD 5/3—ENR 5/9.

N. J., Lakewood—Lakewood Twp. Bd. Educ., Lakewood, rejected bids May 10, school. L.B. $458,800. CD 5/29—ENR 6/6, under LB.

★†**N. Y., Malta**—U. S. Eng., 120 Wall St., New York, Zone 5, June 20, miscellaneous structures, incl. office bldg., 2 storage bldg., 6 observation stations, water supply and sewerage sys., etc., from Thompson Constr. Co., 11 N. Pearl St., Albany. $670,000.

★†**S. C., Beaufort**—Yards & Docks Annex, Navy Dpt., Arlington, Va., June 18, Naval Hospital, from Thompson & Street, Pineville Rd., Charlotte, N. C. $7,220,000. CD 5/16—ENR 5/23.

S. D., Vermillion—State Bd. Regents, Pierre, rejected bids June 7 men's dormitory. $250,000. Hugill, Blatherwick & Fritzel, Boyce-Greeley Bldg., Sioux Falls, archts. CD 4/29—ENR 5/2.

Tex., Galena Park—Galena Park Ind. School Dist., rejected bids May 24, school addn. L. B. $265,000. Job reduced to $165,000. CD 6/5—ENR 6/13.

Tex., Plains—Bd. Educ., Plains, 1 story, brick, stone, rein-con., etc. grammar school and addn. to mechanical shop bldg., from W. D. Light, Plains, $218,000. J. C. Berry & Kerr & Kerr, 312 BW 10 St., Amarillo, archts.

†**Wyo., Bonneville**—Bureau Reclamation, Thermopolis, June 6, office bldg., 2 dormitories, combined garage and shop, five 4-room and 10 five-room residences at Boysen Government Camp, Boysen Unit, Missouri Basin Proj., Spec. 1349, from Dawson, Corbett & Shelp, Rawlins. $203,815. CD 5/24—ENR 5/30.

†**Wyo., Bonneville**—Bureau Reclamation, Thermopolis, cancelled bids to have been opened June 20, concrete-testing laboratory for Boysen Government Camp, Boysen Unit, Spec. 1301. CD 6/5—ENR 6/13.

CONTRACTS AWARDED

Fla., Tallahassee—City, imprv., exten. gas plant, to Ivy H. Smith Co., 1525 San Marco Blvd., Jacksonville, Zone 1. $50,747. Awarded 6/15. Smith & Gillespie, Rogers Bldg., engrs.

Ind., Tipton—Bd. P. Wks., City Hall, two 2,400 hp. engines for proposed Tipton Municipal Light Plant, to Nordberg Mfg. Co., 3073 S. Chase St., Milwaukee, Wis. $328,100.

Minn., Camp Ripley (P.O. Little Falls)—State of Minn., four 200x60 ft. brick, rein.-con. vehicle warehouses, to F. R. Comb Co., 2113 Chicago Ave., Minneapolis. $151,200. Tentative award. Bids 6/14. P. C. Bettenburg & Co., 1437 Marshall Ave., St. Paul, engrs. CD 6/13—ENR 6/20.

★†**N. Y., West Point**—U. S. Eng., 120 Wall St., New York, Zone 5, cadet mess addn., at U. S. Military Academy, to Anthony M. Meyerstein, Inc., 66 Court St., Brooklyn, Zone 2. $1,875,000. CD 5/16—ENR 5/23, under LB.

Tex., College Station—A&M College, College Station, engr. shop bldg., addn., to B. B. Butler, Bryan. $59,600.

★**Tex., Commerce**—East Texas State Teachers College, general contract, dormitory, to Homer A. Parks Constr. Co., Construction Bldg., Dallas. $525,000. Bids 5/28. CD 6/4—ENR 6/6, under LB.

★**Newfoundland, Corner Brook**—Govt. of Newfoundland, Dpt. P. Wks., St. John's hospital for tubercular patients, to J. L. E. Price & Co., Ltd., 680 Sherbrooke St. W., Montreal, Que. Over $2,000,000. A. J. C. Paine, Sun Life Bldg., Montreal, Que., and E. A. Ryan, Canada Cement Bldg., Montreal, Que., archts. CD 6/6—ENR 6/27.

Ont., Port Hope—Wartime Housing Ltd., 159 Bay St., Toronto, 50 houses, to Eastwood Constr. Co., Ltd., Dominion Bank Bldg., Box 796, Peterborough. $250,000. W. J. McAdam, c/o owner, engr. CD 5/28.

COMMERCIAL BUILDINGS

Construction Reports received since this section went to press will be found in Last Minute Construction Reports.

SOON LETS CONTRACT

★**Wash., Seattle**—Wash. Securities Co., Securities Bldg., Zone 1, soon lets contract 8 story, 60x130 ft., steel frame office addn. $750,000. H. Bittman, Securities Bldg., archt. CD 5/2—ENR 5/9.

★**Sask., Regina**—C. A. Boulton, Westman-Chambers, 1791 Rose St., soon lets contract 99 single family dwellings, 1 semi-detached, for Housing Enterprises (Regina), Ltd. $525,000.

Sask., Saskatoon—C. A. Boulton, Westman Chambers, 1791 Rose St., Regina, soon lets contract 40 single and 5 semi-detached dwellings, for Housing Enterprises (Saskatoon), Ltd., Regina, $250,000.

LOW BIDDERS

★**O., Cleveland**—Good Shepherd Home for Girls, E. 30 St. and Carnegie Ave., group bldgs., incl. dormitories, school, administration bldg., and convent, all 2 story, brick, steel, stone, from Walter Butler Co. Inc., 1300 Minn. Bldg., St. Paul, Minn. Est. over $500,000.

CONTRACTS AWARDED

Ala., Montgomery—Nazareth Catholic Mission, Pugh St., 2 story, 31x61 ft., concrete, steel convent, own forces. $225,000. W. C. Douglas, Comer Bldg., Birmingham, archt.

Calif., Burlingame—G. W. Williams, 10 California Dr., 66 homes, Sunnybrae 2 sub division, own forces. $350,000.

Calif., Hayward — **Roman Catholic Archbishop of San Francisco, 1100 Franklin St.,** parochial school, to Zaballos Bros., 850 Soto St. Est. $210,000. V. Buckley, 110 Sutter St., San Francisco, archt.

Calif., Los Angeles—San Fernando Furniture Co., 820 S. Main St., 2 story, 100x200 ft., rein.-con. furniture sales bldg., Menlo Ave. and Olympic Blvd., to Stronach Constr. Co., 115 N. Robertson Blvd. $225,000. A. Froelich, 367 S. Robertson Blvd., archt.

★**Calif., Napa**—W.W. Polley, 1094 Silverado Trail S., 65 homes, Frank Scansi Memorial subdivision, 51 east of S. Jefferson St. and 14 on Jefferson St. in Sonoma Park, own forces. $520,000.

Calif., Van Nuys—Crown Constr. Co., 706 S. Valencia St., Los Angeles, 42 frame, stucco 6 room dwellings, 8,000 blocks on Irvine Ave. and adjacent streets, to F. Stein, 131 Vista St., Los Angeles. $354,700.

Conn., Stamford—Owner, c/o contractor, thirty-five 4 to 6 room homes, Cold Spring Rd., to Hartz & Jevne, Stamford Rd. Est. $225,000.

Del., Bellefonte (Wilmington P.O.)—Grandview Constr. Co., Bellefonte, residential development, separate contracts. Over $240,000.

★**Del., Brandywine Hundred (Wilmington P.O.)**—J. A. Bader Co., North American Bldg., Wilmington, residential development, separate contracts. Over $500,000.

★**Del., Claymont Heights (Claymont P.O.)**—Claymont Hills Corp., c/o T. B. O'Tool, Inc., DuPont Bldg., Wilmington, residential development, separate contracts. Over $2,500,000.

Del., Cranston Heights (P.O. Wilmington)—H. H. Lambert, Box 29, residential development, separate contracts. Over $205,000.

Del., Dover—Melvin Caegar, Dover, residential development, separate contracts. $220,000.

Del., Dover—H. Taylor, DuPont Blvd., residential development, separate contracts. $205,000.

★**Del., Elsmere**—A. J. Vilone, 1712 Linden St., Wilmington, residential development, separate contracts. Over $2,000,000.

Del., Milford—B. Seavy, Inc., Milford, residential development, separate contracts. Over $220,000.

Del., Newark—Park Place Developers, 4 Tanglewood Lane, residential development, separate contracts. $250,000.

★**Del., New Castle**—Christiana Realty, Inc., 214 S. Ford Ave., residential development, separate contracts. $800,000.

★**Del., New Castle**—Collins Park Bldrs., Inc., 527 Welsh St., Chester, residential development, separate contracts. Over $1,200,000.

★**Del., Wilmington**—Boulevard Constr. Co., 1508 Pennsylvania Ave., residential development, separate contracts. Over $2,000,000.

Del., Wilmington—W. Brauble, 4308 Market St., residential development, separate contracts. $210,000.

Del., Wilmington—Castle Construction Co., 7 St. and Greenhill Ave., residential development at Swanyck, separate contracts. Over $205,000.

Del., Wilmington—B. Ciotti, 1711 W. 8 St., residential development, separate contracts. Over $205,000.

Del., Wilmington—Feldman Bros., 1424 Clayton St., residential development, separate contracts. $220,000.

Del., Wilmington—D. Fontana Constr. Co., Inc., 112 A St., residential development, separate contracts, $220,000.

Del., Wilmington—W. P. Garrett, 4530 Osage Ave., Phila., Pa., residential development, separate contracts. $240,000.

Del., Wilmington—G. Giovannozzi & Sons, Caseway and South Market Sts., residential development, separate contracts. $210,000.

Del., Wilmington—Judiken, Inc., 1505 W. 7 St., residential development, separate contracts. $240,000.

Del., Wilmington—New Castle Builders, Inc., 2811 Market St., for Wilmington Manor, separate contracts. Over $240,000.

Del., Woodcrest (Wilmington P.O.)—G. McGovern, Inc., 205 W. 4 St., Wilmington, residential development, separate contracts. Over $205,000.

★**Fla., Brooksville**—J. C. Emerson & Sons, Brooksville, 52 concrete block houses, own forces. $500,000.

Fla., Tampa—Whealton & Mason, 221 E. Lafayette St., 40 houses, Maryland Manor section, and 10 houses off Bayshore Blvd., own forces. $300,000.

Ind., Muncie—Indiana Bell Telephone Co., 240 N. Meridian St., Indianapolis, 1 and 2 story, 83x101 ft. brick, stone, rein.-con., structural steel telephone office and exchange, to Leslie Colvin, 507 Bd. Trade Bldg., Indianapolis. Est. $300,000. Awarded 6/18. Vonnegut & Wright, 1126 Hume-Mansur Bldg., Indianapolis, archts.

Md., Baltimore—Built Well Homes, 901 N. Patterson Park Ave., seventy-four 2 story, 18 x 30 ft., brick, cinder block residences, 4,400 and 4,500 block Mannasota Ave., separate contracts. $300,000.

★**Md., Baltimore**—Hamy Bldg. Co., 2303 Ocala Ave., one hundred twenty 20 x 32 ft., 6 room brick residences, Wabash Ave., Hilton Rd., Yosemite Ave., separate contracts. $800,000.

Md., Baltimore—Northern Parkway Estates, 6130 Dartford Rd., Essex, seventy-four 1 and 2-family, 2-story, bsmnt., 20x30 ft., twenty-six 2-family and forty-eight 1-family, brick homes, separate contracts. $400,000. G. M. Cox, c/o owner, archt.

★**Md., Baltimore**—Park Homes, Inc., 3300 Tioga St., three hundred 2-story, bsmnt., 6-room, residences, separate contracts. $1,500,000. H. A. Miller & Assoc., 337 St. Paul Pl., archts.

Mo., Kirkwood (St. Louis, 22, P.O.)—Walter F. Hellmich, Inc., 1037 Big Bend Blvd., St. Louis, Zone 19, seventy 1 story, 24x32 ft., frame, rein.-con. dwellings for veterans, own forces. Over $400,000.

Mo., St. Louis—Syndicate, c/o G. G. Buder, engr., 8933 Bridgeport Ave., Brentwood, St. Louis, Zone 17, 1 and 2 story, bsmnt., clinical and medical bldg., 3657 Grandel Sq., to Murch-Harvis Co., 718 Locust St., Zone 1. Est. approx. $210,000. P. John Hoener, 3417 South Kingshighway Blvd., Zone 9, archt.

N. Y., Bayside—Ty. Holland Homes, c/o G. W. Swiller, archt., 535 E. Tremont Ave., New York, Zone 57, thirty-three 1 family homes, 206 St., 58 Ave., and Horace Harding Blvd. Owner builds. $300,000. CD 5/27—ENR 6/6.

N. Y., Brooklyn—H. Aarons, c/o I. Kallich, archt., 161 Remsen St., eighteen 2 story, 2 family dwellings, 2302-48 E. 29 St. Owner builds. $217,000. CD 5/14—ENR 5/23.

N. Y., Flushing—Allied Federation, Inc., c/o O. Silverstone, archt., 153 Pierrepont St., Brooklyn, Zone 2, forty-two 2 story homes, 194 St. Owner builds. $294,000. CD 5/27—ENR 6/6.

N. Y., Flushing—Brairwood Holding Corp., c/o A. A. Marjey, archt., 90-50 Parsons Blvd., Jamaica, thirty 2-family dwellings, Saul St., Pople and Avery Aves. Owner builds. $345,000. CD 5/28—ENR 6/6.

★**N. Y., Flushing**—Gross Morton Co., 160-16 Jamaica Ave., Jamaica, sixty 2 family homes, 199 and 198 Sts., 75 and 73 Aves. Owner builds. $540,000. A. E. Allen, 90-34 161 St., Jamaica, archt. CD 5/27—ENR 6/6.

N. Y., Flushing—Kissena Bldg. Corp., c/o M. Kessler, archt., 118 E. 28 St., New York, Zone 16, forty-seven 1 family dwellings, North Hempstead Turnpike, W. 153 and E. 150 Sts. Owner builds. $335,000. CD 5/22—ENR 6/13.

N. Y., Flushing—Sonat Realty Corp., c/o G. Miller, archt., 67 W. 44 St., New York, Zone 18, thirty-one 2 story, 1 family dwellings, 198 St., 67 and 69 Aves. Owner builds. $279,000. CD 5/22—ENR 6/13.

N. Y., New York—Arlington Constr. Co., 2200 Oxford Ave., Zone 63, thirty 2 story dwellings, Hawthorne St., Woodhull and Allenton Aves. Owner builds. $270,000. CD 5/14—ENR 5/30.

N. Y., New York—Lamay Constr. Co., 4077 Park Ave., Zone 57 eighteen 2 story, dwellings, Van Nest Ave., Flower and Bogart Aves. Owner builds. $265,000. CD 5/28—ENR 6/13.

N. Y., North Tonawanda—J. Wrazin, 235 Spalding St., 43 frame residences for veterans, on Webster Dr., Taber and Lindsay Aves. Owner builds. Approx. $365,000.

N. Y., Queens Village—Continental Homes, Inc., c/o S. Paul, archt., 163-18 Jamaica Ave., Jamaica, thirty-two 1 family homes, Springfield Blvd. and 90 Ave. Owner builds. $231,500. CD 5/28—ENR 6/13.

★**Ore., Hillsboro**—McLain Constr. Co., Rte. 1, 70 houses, day labor. $600,000.

Ore., Milton—Collier & Harris, Pendleton, 50 houses, day labor. $275,000. CD 9/11/45—ENR 9/20/45.

Ore., Pendleton—Collier & Harris, Pendleton, sixty-seven 1 story, some bsmnt. houses, day labor. $402,000.

Ore., Portland—Lewis & Clark College, 0615 S.W. Palatine Rd., 2 story, 30x38 ft. heating plant, 90x100 ft. gymnasium, 28x186 ft., rein.-con. wing, to Donald M. Drake Co., Lewis Bldg. Est. $225,000. CD 5/29/45—ENR 6/14/45.

★**Pa., Chester**—F. A. Collins, Inc., 527 Welsh St., Chester, residential development, separate contracts. Over $2,000,000.

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COMMERCIAL BLDGS. (Contracts Awarded, Cont'd.)

★**Pa., Harrisburg**—Wilson Park Homes, 254 W. 64 St., New York, 19, N. Y., residential development, separate contracts. Over $1,000,000.

★**Pa., Hellertown**—Willis Homes, Inc., 286 Fifth Ave., New York, N. Y., residential development, separate contracts. Over $650,000.

★**Pa., Phila.**—Bernard Hamberg, c/o Jackson-Cross Co., Roosevelt Blvd. and Rising Sun Ave., residential development, separate contracts. Over $500,000.

★**Pa., Spring Haven Manor (Swarthmore P. O.)**—Woodland Gardens, Inc., 512 Chester Pike, Prospect Park, 250 residences, separate contracts. Over $1,500,000.

★**Pa., Sunnybrook (Oreland P. O.)**—Sunnybrook, Inc., 6 E. Mt. Carmel Ave., Glenside, 66 residences, separate contracts. $660,000.

★**Tex., Kingsville**—Kingsville Building Corp., Kingsville, 196 dwelling units, to Leslie Constr. Co. (formerly Leslie & Kidd) Kingsville, approx. $1,160,000. CD 8/1/45—ENR 8/9/45, under LB.

Tex., McAllen—R. A. Rowland, McAllen, residences. Owner builds. $250,000.

Wash., Seattle—O. H. Cavness, 4505 14 Ave. S, 40 frame houses at Sheridan Heights, day labor. $380,000.

★**Ont., St. Catherines**—Housing Enterprises (St Catherines), Ltd., 395 Fleet St. W., Toronto, 92 single dwellings, 5 semi-detached, to Ontario Constr. Co., Ltd., P. O. Box 36, St. Catherines, approx. $500,000.

Que., Gatineau Mills—Parish of St. Jean Marie, Rev. V. LaBrosse, 50x125 ft., concrete, stone church, to E. Bennet & Son, 35 Aylmer Rd., Hull, approx. $300,000. Martineau & Talbot, 200 Bay St., Toronto, Ont., archts.

INDUSTRIAL BUILDINGS

Construction Reports received since this section went to press will be found in Last Minute Construction Reports.

BIDS ASKED

Bids Asked July 3

Mo., Sugar Creek—RESEARCH—Standard Oil Co., 910 S. Michigan Ave., Chicago, Ill., 1 story, brick, concrete, steel engineering and research bldg., 100 octane plant, cracking plant, isomerization plant. Holabird & Root, 333 N. Michigan Ave., Chicago, Ill., archts.

Bids Asked

Tex., Gladewater—PUMPING STATION—Pan-American Pipe Line Co., M. Esperson Bldg., Houston, crude oil pipeline pump. sta. $75,000.

Tex., Hainesville (near Quitman)—PUMPING STATION—Pan-American Pipe Line Co., M. Esperson Bldg., Houston, crude oil pipeline pump. sta. $75,000.

Tex., Hawkins—PUMPING STATION—Pan-American Pipe Line Co., M. Esperson Bldg., Houston, crude oil pipeline pump. sta. $75,000.

★**Tex., Midland**—GAS PLANT—Stanolind Oil & Gas Co. & Associates, Fair Bldg., Fort Worth, gasoline mfg. plant. $15,000,000. CD 4/24—ENR 5/16.

Wis., Milwaukee—FREIGHT TERMINAL—Olson Motor Service, 1290 W. Bruce St., Zone 4, 1 story, L-shaped, 53x136 and 102x147 ft., steel trusses, concrete block freight terminal, concrete fdn. H. I. Messiner, 231 W. Wisconsin Ave., Zone 3, archt.

Wis., Blair—FEED MILL—P. S. Olson, Blair, feed mill. $60,000. F. J. Fuchs, 115 S. 4 St., LaCrosse, archt. CD 4/25/45—ENR 5/3/45.

Wis., Watertown — FACTORY — Sherman Products Co., c/o Grassold & Johnson, archts., 734 N. Jefferson St., Milwaukee, Zone 2, 1 story, 60x120 ft., and 30x30 ft., and steel, transit siding and concrete block factory, concrete fdn.

SOON LETS CONTRACT

★**Del., Wilmington** — BOILER HOUSE — Delaware Floor Products, Inc., Christiana Ave., soon lets contract mfg. bldg. and boiler house. $500,000.

Ill., North Chicago — FACTORY — Abbott Laboratories, North Chicago, soon lets contract 3 story, 30x193 ft., brick, rein.-con. factory Bldg. A-1 addn. Battey & Childs, 231 S. LaSalle St., Chicago, archts.

Ill., North Chicago — RESEARCH — Abbott Laboratories, North Chicago, soon lets contract 3 story, 123x171 ft. brick, rein.-con., U shaped research bldg. addn. Shaw, Naess & Murphy, 80 E. Jackson St., Chicago, archts.

Mass., Framingham—FACTORY—Dennison Mfg. Co., Howard St., soon lets contract 1 story brick, steel factory. Over $55,000. I. Richmond, 16 Arlington St., Boston, archt.

Pa., Harmarville—BOILER—Gulf Research & Development Co., Gulf Bldg., Pittsburgh, soon lets contract, 1 story, 70x120 ft., brick boiler bldg., for power plant. $150,000.

LOW BIDDERS

★**Tex., Amarillo**—PLANT, etc.—Texhoma Natural Gas Co., Amarillo, will not construct dehydration plant expansion. $150,000; compressor station expansion, $400,000. Project abandoned. CD 9/27/45—ENR 10/11/45.

Tex., Goose Creek—WAREHOUSE—Houston Lighting & Power Co., 1016 Walker St., Houston, rejected bids May 31, masonry, steel, rein.-con. warehouse. $65,000. CD 5/27—ENR 5/30.

CONTRACTS AWARDED

★**Calif., Gilroy**—PLANT—Be Ge Mfg. Co., 385 N. Monterey St., steel, machinery mfg. plant, to W. Radtke, 4 and Princevalle Sts. Est. $500,000. Bay Cities Engrg. Co., 644 Mission St., San Francisco, engr. CD 5/17—ENR 5/23.

Calif., Los Angeles—FACTORY—Electrical Products Co., 1128 Venice Blvd., 250x300 ft., gunite, corrugated iron factory, 1120 N. Main St., to The Austin Co., 777 E. Washington Blvd. $300,000.

Calif., Los Angeles—FACTORY—M. Z. Meyer, c/o T. Saehn, engr., 3214 Glenhurst Ave., 2 story, reinforced brick factory, 1136 S. Santee St., to Central Bldg Co., 707 S. Broadway. $70,000.

Calif., Los Angeles — FACTORY — Royal Paper Box Co., 1136 S. Los Angeles St., 2 story, rein.-con. factory, Pico Blvd. and Soto St., to Central Building Co., 707 S. Broadway. $200,000. T. Jaehn, 3214 Glenhurst Ave., engr.

Calif., Sacramento — FOUNDRY — Pacific Coast Aggregates, 16 and A Sts., concrete, steel batching plant, 12 aggregate storage bunkers, to H. W. Robertson, 2917 T St. Est. over $100,000. CD 6/17—ENR 6/20.

Calif., Vernon—FACTORY, etc.—Southern California Bag Co., 1329 Santa Fe Ave., Los Angeles, 103x500 ft. factory and warehouse, 4900 Corona Ave., to W. E. Robertson Co., 4016 W. Jefferson Ave., Los Angeles. Approx. $200,000. M. Maltzman, 4015 W. Jefferson Ave., Los Angeles, archt. F. A. Sayler, 953 S. Hope St., Los Angeles, engr.

Calif., Woodland — PLANT — M. D. Green Rice Milling Co., Merritt Sts., steel, concrete rice processing plant, to Berlinger Constr. Co., Park St., Chico. Est. $55,500.

Conn., Bridgeport—WAREHOUSE—Osschan Electric Supply Co., 728 Main St., 2 story, 55x95 ft., brick, steel, concrete, warehouse, Main St., to J. Simpson, 41 Putnam St. Est. $55,000. Lyons & Mather, 211 State St., archts.

Conn., Bridgeport—FACTORY—Remington Rand, Inc., 2 Main St., brick steel plastics factory, Main St., to Gellatly Constr. Co., 25 Housatonic Ave. Est. $225,000. CD 5/24—ENR 5/30.

Conn., Greenwich—PLANT—Marine Design Corp., 644 Steamboat Rd., 3 story, 80x100 ft., rein.-con., brick, transite experimental laboratory, Steamboat Rd., to Peter Mitchell, Inc., Hackett Bldg. Est. $60,000.

Conn., Hartford — FACTORY — Superior Spring & Mfg. Co., Inc., 297 Washington St., 1 story, 80x155 ft., brick factory addn., Washington St. Owner builds. $55,000. G. L. Dunkelberger, 44 Wolcott Hill Rd., archt.

Del., Wilmington—AUTO SALES, etc.—Hollywood-Perkins Auto Agency, c/o Silverman & Levy, archts., 1411 Walnut St., Phila., Pa., auto sales and service center, to McCloskey &; Co., Inc., 1620 W. Thompson St., Phila., Pa. $250,000. Awarded 6/14.

Fla., Jacksonville—WAREHOUSE—Peaslee-Gaulbert Corp., 2301 Main St., brick, concrete, steel warehouse, to R. McDonald Smith, 3867 Arden St., approx. $200,000. W. Kenyon Drake, Rogers Bldg., archt. CD 1/14—ENR 1/17, under CA.

Fla., Sanford—POWER PLANT—Florida Power & Light Co., Sanford, altering, expanding power plant facilities, own forces. $143,000. CD 2/19—ENR 2/28.

Fla., Tampa—WAREHOUSE—Maas Bros. Dpt. Store, Franklin and Zack Aves., concrete, steel warehouse, refrigerated storage room, to Clarson & Mills, P.O. Box 57, St. Petersburg. $220,000.

Fla., Jacksonville—PLANT—C. P. Tatt & Co., 236 W. Bay St., brick, concrete, steel, cold storage plant, own forces. $60,000. A. C. Hopkins, 409 W. Adams St., archt.

Fla., Jacksonville—PLANT—Wright Hotel Equip. Co., 822 W. Bay St., 2 story plant, Liberty St. between Seaboard Railway and 11 St., to R. McDonald Smith, 3867 Arden St., Zone 5. $200,000. Awarded 6/14. W. K. Drake, Rogers Bldg., Zone 1, archt.

Ill., Chicago—FREIGHT HOUSE—Chicago, Milwaukee, St. Paul & Pacific R.R., R. J. Middleton, ch. engr., Union Station, Zone 6, 1 story, 60x600 ft., brick, concrete, steel freight house, to Ragnar-Benson, 4744 W. Rice St. Est. $300,000.

Ill., Decatur—WAREHOUSE—F. W. Heinkel, United Grocers, Decatur, grocery warehouse, own forces. $65,000. Swen Clausen, Standard Office Bldg., archt. CD 2/6—ENR 2/14.

Ill., Chicago—FACTORY—Utility Tool & Die Works, 430 S. Green St., 1 story, 100x125 ft., brick, rein.-con. factory and office, to Continental Constr. Co., 340 N. Central Ave. Est. $78,500. F. W. Langhenrich, 4541 W. Washington Blvd., archt.

★**Ill., Kankakee**—PLANT—Borden Co., 350 Madison St., New York, N. Y., four 5 and 6 story, concrete soybean plant bldgs., to James Stewart Corp., 231 S. LaSalle St., Chicago. $2,500,000.

★**Ind., Muncie**—PLANT—Warner Gear Div. Borg Warner, Muncie, 1 new plant and 3 addns. to increase space at Plants 2 and 4 west of here, to A. J. Glaser & Associates, Muncie. Est. $650,000.

★**Md., Baltimore** — PLANT — International Harvester Co., 180 N. Michigan Ave., Chicago, Ill., parts depot, to Morrow Bros. Inc., 2315 N. Charles St. $600,000. Bids 5/15. CD 5/3—ENR 5/9.

Mass., Gardner—FACTORY—Collier Keyworth Co., Gardner, brick factory addn for making parts for blowers, fire protection equip., to E. J. Cross Co., 150 Prescott St., Worcester. Est. $70,000. CD 5/28—ENR 6/6.

Mass., Springfield — FACTORY — Holyoke Card & Paper Co., Fisk Ave., brick factory addns., alteration, Fisk Ave., to E. F. Carlson, Ind., 1694 Main St. Est. $55,000. McClintock & Craig, Inc., 458 Bridge St., archts.

★**Mass., Warwick**—FACTORY—Johnson Automatic Mfg. Co., Second Ave., Cranston, R. I., brick, steel factory, Jefferson Blvd., to Gilbane Bldg. Co., Inc., 90 Caverly St., Providence, R. I. Est. $505,500. CD 5/20—ENR 5/23, under CA.

Minn., Minneapolis—PLANT—Toro Mfg. Co., 3042 Snelling Ave., general contract 2 story, rein.-con., brick machine shop addn. at plant, to A. Johnson Constr. Co., 608 Foshay Tower. Est. $119,000. Toltz, King & Day, 1509 Pipneer Bldg., St. Paul. engs.

Mo., St. Louis—MANUFACTURING—Century Foundry, 3727 Market St., Zone 10, 1 and 2 story, 245x250 ft., brick, steel frame, concrete mfg. bldg. addn., to Gamble Constr. Co., 620 Chestnut St., Zone 1. Est. $165,000 plus with equip. Bids 5/22. CD 5/15—ENR 5/23.

O., Cleveland—PLANT—American Coach & Body Co., 9500 Woodland Ave., two 1 story, 50x200 ft., and 1 100x120 ft., brick, steel, concrete factory addns., to H. E. Kiefman Constr. Co., Lorain St. Bank Bldg. $65,000. A. C. Wolf, Swetland Bldg., archt.

O., Cleveland—PLANT—Hughes Provision Co., 3190 W. 65 St., alterations, adns., creating addnl. cooler room facilities in packing house, to Peck & Udell, 4500 Euclid Ave. $55,000. H. M. Morse & Co., 1500 Superior Ave., engrs.

O., Painesville—FACTORY—Glenn L. Martin Co., Middle River, Baltimore, Md., design and instruction factory bldgs., mfg. plastic similar to Vinylite, to Blaw-Knox Constr. Co., Farmers Bank Bldg., Pittsburgh, Pa. $190,000. CD 6/13—ENR 6/20.

Ore., Foster—PLANT—Willamette National Lumber Co., 212 Pacific Bldg., lumber plant, shingle mill, log pond, sawmill, planing unit, dry and shipping sheds, power plant, machine shop and accessory plants, mostly frame constr., to D. M. Drake Co., Lewis Bldg., Portland. Est. $300,000. Industrial Engineers & Contractors, 711 Middle Waterway, Tacoma, Wash., engrs. CD 5/27—ENR 6/13.

★**Ore., Nyssa**—PLANT—Avoset, Inc., 24 California St., San Francisco, Calif., 1½ story, concrete dairy products plant, to Bechtel Bros. McCone Co., 220 Bush St., San Francisco, Calif. Est. $750,000.

Ore., Portland—REMANUFACTURING and SORTER MILL—Inman-Poulsen Lumber Co., 316 S.E. Division St., 96x100 ft. frame remanufacturing and sorter mill, to Reimers & Jolivette, Builders Exch. Bldg. Est. $150,000.

Pa., Ambridge—FACTORY—National Supply Co., Grant Bldg., Pittsburgh, 1 story, brick, steel factory addn., to E. W. Falck Co., Beaver Rd., Leetsdale. Est. $65,000.

Pa., Arnold—GARAGE, etc.—West Penn Power Co., West Penn Bldg., 14th Wood St., Pittsburgh, 2 story, bsmnt., brick, concrete garage, storage and office to Edward Crump Jr., Inc., 4031 Bigelow Blvd., Pittsburgh. Est. $100,000. CD 12/20—ENR 1/3.

Pa., Carnegie—GARAGE—Holland Chevrolet Co., Carnegie, 1 story, 100x140 ft., brick, stone, steel garage, to Dick Constr. Co., 2532 Liberty Rd., Pittsburgh. Est. $55,000. Kuhn & Newcomer, 508 2 Ave., Pittsburgh, archts.

Pa., Chester—GAS PLANT—Phila. Electric Co., 1000 Chestnut St., Phila., Tilghman St. gas plant addns., alterations, own forces. $75,000.

Pa., Corry—FOUNDRY, etc.—Ajax Iron Co., Corry, brick, steel concrete foundry, assembly, testing and shipping bldgs., to Henry Shink Co., Erie, Est. $250,000. Meyers & Johnson, Erie, archts. CD 3/1—ENR 4/4.

Pa., Elwood City—FACTORY—Mathews Conveyor Co., Elwood City, 1 story, brick, steel factory addn., to Uhl Constr. Co., 6001 Butler St., Pittsburgh. Est. $55,000.

Pa., Harmarville—MAINTENANCE SERVICE—Gulf Research & Development Co., Gulf Bldg., Pittsburgh, 2 story, bsmnt., brick, steel maintenance service bldg., to Geo. W. Seaman, 6388 Penn Ave., Pittsburgh, $273,567. CD 4/4—ENR 4/11.

Pa., Phila.—FACTORY—S. Segal, Jr., 250 S. Broad St., factory, to J. P. McDevitt, 1061 Pratt St., over $55,000. Awarded 6/12. L. J. Cowan, 1237 Market St., archt.

Pa., Phila.—MANUFACTURING—Strick Co., Whitaker and Godfrey Aves., mfg. bldg., to J. D. Morrissey, Inc., 9119 Trandford Ave. $56,000. Awarded 6/14.

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INDUSTRIAL BLDGS. (Contracts Awarded, Cont'd.)

Pa., Sharpsburg—BOTTLING PLANT—Fort Pitt Brewing Co., Sharpsburg, 3 story, bsmnt., 126x129 ft., rein.-con. bottling plant, to Navarro Corp., 6219 Broad St., Pittsburgh. Est. **$150,000.** Harley Ellington & Day, 1507 Stroh Bldg., Detroit, Mich., archts. CD 1/23—ENR 1/31.

Tex., Baird—REFINERY—Baird Refining Co., Baird, addnl. gasoline refinery. Owner builds. **$90,000.**

Tex., Denton—PLANT—Moore Business Form Co., plant for industrial business forms mfg., to Carpenter Bros., 1317 Plowman St., Dallas, approx. **$450,000.** J. Murrell Bennett, Tower Pet. Bldg., Dallas, archt.

Tex., Fort Worth—GARAGE, etc.—Milwaukee Bottling Co., 814-9 Ave., garage and storage bldg., to B. B. Adams & Son, 1 National Bank Bldg., **$111,450.** Texas Architects & Engineers, 701 Insurance Bldg., archts. & engrs.

Tex., Houston—PLANT—Black-Brollier, Inc., 101 Blodgett St., concrete products and building materials mfg. plant, force account. Approx. **$70,000.** CD 4/26—ENR 5/2.

Tex., Marshall—REPAIR SHOP—Texas & Pacific Railway Co., R. J. Gammie, ch. engr., Texas & Pacific Bldg., Dallas, Zone 2, railway equip. repair shop, force account. Approx. **$65,000.**

★**Tex., Sinton**—PLANT—Plymouth Oil Co., c/o Victoria Hy., recycling plant and gasoline refinery, to Jones-Laughlin Supply Co., 108 N. Trenton St., Tulsa, Okla. approx. **$1,560,000.** CD 6/17—ENR 6/27.

★**Wash., Camas**—PLANT—Crown Zellerbach Corp., Pub. Service Bldg., Portland, Ore., 66x120 ft. kraft bleach plant, 80x120 ft., rein.-con. kraft screen fatory at paper plant, to L. H. Hoffman, 715 Columbia St., Portland. Est. **$750,000.**

Wash., Spokane—GARAGE, etc.—Babcock Motors, 4 and Howard Sts., rein.-con., masonry garage and display bldg., to P. J. Young & Son, W. 24 Mission St., Spokane. Est. **$100,000.** A. W. Cowley, c/o owner, archt.

Wis., Merrill—GARAGE—Seidell Garage, Merrill, 1 story, 78x120 ft., concrete block, steel garage, concrete fdn., to E. W. Schields, Merrill. C. E. Mohs & Assoc., 2550 University Ave., Madison, archts.

Wis., Middleton — GARAGE — Suburban Motor Co., Middleton, design and construction 1 story, 70x120 ft., steel, concrete block garage, concrete fdn., to C. E. Mohs & Assoc., 2550 University Ave., Madison.

Wis., Monroe—FACTORY—Wyss Cheese Co., Monroe, 2 story, 63x84 ft., rein.-con., steel, concrete block cheese factory, to J. H. Bruni, Monroe. Est. **$55,000** or more. S. W. Howe, Monroe, archt.

Wis., Superior—FACTORY—Silvercrest Industries, Superior, 3 story, 80x282 ft., brick, wood beams and columns factory stone and concrete fdn., to L. Dauplaise, 1112 Tower Ave. Est. **$115,000.** Hanson & Doberman, 205 Telegram Bldg., archts.

UNCLASSIFIED

Construction Reports received since this section went to press will be found in Last Minute Construction Reports.

BIDS ASKED

Bids Asked July 2

Fla., St. Petersburg—DAM—City and Pinellas Co., c/o City Manager, dam and roadway across mouth of Long Bayou at point of entrance into Boca Ciega Bay.

Bids Asked July 3

Fla., Jacksonville — TRANSMISSION CABLES—City, duct lines, man-holes, for installing 13 kva. power transmission cables between Laura St. sub-station and Southside sub-station. Plans deposit $2.50. Reynolds, Smith & Hills, 10 S. Laura St., engrs.

Bids Asked July 8

Ore., Eugene—SWIMMING POOL—City, Hall, swimming pool and shower-locker bldg. $75,000. Plans deposit $20. Cunningham & Assoc., Spalding Bldg., Portland, engrs. CD 5/24—ENR 5/30.

Bids Asked July 10

†**New Mexico** — TRANSMISSION LINE — Bureau Reclamation, Custom House, Denver, Colo., constructing Alamogordo Air Base tap to Alamogordo substation 115-kilo-volt transmission line, Rio Grande Proj., New Mexico-Texas, Spec. 1375.

Bids Asked About July 13

Ill., Peoria—POOL—Peoria Pleasure Driveway & Park Dist., Glen Oak Park, repairing Logan Field Pool. $60,000.

Bids Asked July 17

Calif., Oceanside—PIER—City, City Hall, repairing, exten. pier. $175,000-$214,000. Leeds, Hill & Jewett, 601 W. 5 St., Los Angeles, engrs. CD 11/15—ENR 11/22.

Tex., Midland—GAS LINES—Stanolind Oil & Gas Co. & Associates, Fair Bldg., Fort Worth, gas lines. $100,000.

★**Tex., Quitman**—OIL PIPE LINE—Pan-American Pipe Line Co., M. Esperson Bldg., Houston, doubling capacity main crude oil trunk pipeline. $250,000; exten. and imprv. crude oil pipeline gathering sys., $175,000; crude oil pipeline pump. sta. $100,000. CD 6/13.

SOON LETS CONTRACT

Illinois—TRANSMISSION LINES — Edgar Electric Co-operative, Parish, soon lets contract 263 mi. transmission lines, Edgar Co., approx. $250,000. Stanley Engrg. Co., Muscatine, Ia., engr. CD 6/6.

LOW BIDDERS

†**Calif., El Toro**—AIR STATION BLDGS.—Yards & Docks Annex, Navy Dpt., Arlington, Va., June 14, converting two 2 story barracks into apartments, erecting 50 Lomoja hut apartments for married personnel at Marine Corps Air Sta., Spec. 17795, from Allison Honer Co., P. O. Box 84, Santa Ana. **$397,500.**

†**Calif., El Toro** — TAXIWAY LIGHTING SYS.—Yards & Docks Annex, Navy Dpt., Arlington, Va., June 4, taxiway lighting sys. at Marine Corps Air Station, Spec. 17781, from California Electric Works, Ltd., 424 8 Ave., San Diego. **$64,500.**

†**Calif., Herlong**—TANKS—U. S. Eng., 1209 Eighth St., Sacramento, Zone 8, June 12, tanks for ordnance vehicle storage at Sierra Ordnance Depot, near here, Spec. 1226, from Erbentraut & Summers, 596 Pennsylvania St., San Francisco. **$178,512.**

†**Calif., Inyokern**—RADIO TRANSMITTER—Yards & Docks Annex, Navy Dpt., Arlington, Va., June 7, Area B facilities, radio transmitter road, tower, magazine, at Naval Ordnance Test Station, Spec. 17482, from Haddock Engineers, Ltd., 129 W. 2 St., Los Angeles. **$293,322.** CD 5/24—ENR 5/30.

†**Conn., New London**—PIER—Yards & Docks Annex, Navy Dpt., Arlington, Va., June 11, concrete pier, approaches, Spec. 17669, from Merritt Chapman & Scott Corp., 292 Pequot Ave., New London, **(1) $370,385 (2) $333,140.** CD 5/31—ENR 6/6.

†**Fla., Jacksonville** — TARGET MACHINES and GUN RANGES—Yards & Docks Annex, Navy Dpt., Arlington, Va., rejected bids May 21, addns., imprvs. Mobile Target Machines and Gun Ranges, Spec. 16854, NOY 12652. CD 5/2—ENR 5/9.

Fla., St. Petersburg—ATHLETIC FIELD—City, c/o Manager, June 14, baseball field, from General Materials Co., 24 St. **$45,260.** CD 6/4—ENR 6/6.

Fla., St. Petersburg—DAM and DIKES—Pinellas Co., R. E. Green, clk., Long Bayou Dam and dikes to create Lake Seminole, near here, from J. A. Benton, St. Petersburg. **$188,988.**

★†**Md., Patuxent River (br. Wash. D. C.)**—ELECTRONICS TEST HANGAR, etc.—Yards & Docks Annex, Navy Dpt., Arlington, Va., June 12, electronics test hangar and heating plant, Naval Air Test Center, Spec. 16292, from Tuller Constr. Co., 95 Monmouth St., Red Bank, N. J. **$1,759,740.** CD 5/31—ENR 6/6.

Mass., East Boston—TERMINAL—American Airlines, General Logan Airport, brick terminal, addnl. bldg., Logan Airport, from M. S. Kelliher Co., 294 Washington St., **$89,620.** CD 5/23—ENR 5/30.

Mass., Melrose—ATHLETIC FIELD—City, Dpt. Parks, Park Comn., Melrose, June 14, athletic field, land work, ball playing facilities, Parkway, from S. Rotundi & Son, 140 Franklin St., **$89,700.** CD 3/21—ENR 4/4.

†**Mass., Squantum**—AIR STATION IMPROVEMENTS—Yards & Docks Annex, Navy Dpt., Arlington, Va., June 13, water front facilities, incl. riprapping, marine timber work sheet piling, filling and grading, underground drainage, at Naval Air Station, Spec. 17824, from Marinucci Bros. & Co., 51 Ceylon St., Dorchester, **$35,368.** CD 6/3—ENR 6/6, under Water Supply.

†**Mass., Wetover Field (sta. Chicopee Falls)**—RESEALING JOINTS—U. S. Eng., 31 St. James St., Boston, Zone 15, June 14, T-249-INV, No. 8 resealing runway joints, from Railway Waterproofing Corp., Lynbrook, N. Y. **$43,443.**

Mo., St. Louis — TERMINAL BLDG. and HANGAR—City, M. M. Kinsey, pres. Bd. Pub. Service, City Hall, Zone 3, June 11, altering, addns., terminal bldg. and adjacent hangar at Lambert-St. Louis Municipal Airport, from Brockmeyer Constr. Co., Missouri Theatre Bldg., 634 N. Grand Blvd., Zone 3, **$46,883.** Bridges & Bldgs. Sect., A. Osburg, archt. W. Creclius, 301 City Hall, Zone 3, ch. engr. CD 5/27—ENR 5/30.

†**N. J., Cape May**—AIR STATION—Yards & Docks Annex, Navy Dpt., Arlington, Va., June 7, altering several bldgs., Naval Air Station, from G. H. Evans, 1124 Fairmount Ave., Phila., Pa., **$49,789.** CD 5/31.

★†**N. C., Cherry Point (br. New Bern)**—AIR STATION BLDGS—Yards & Docks Annex, Navy Dpt., Arlington, Va., June 14, housing program for married service personnel, Marine Corps Air Station, Spec. 17940, from T. A. Loving & Co., Goldsboro. **$1,822,234.**

Oklahoma — TRANSMISSION LINES — Southwestern Electric Co-operative, Durant, 175 mi. transmission line Bryan Co., from Teague & Goodman Co., Denison, **$156,686.** CD 12/2—ENR 12/20.

★†**Ore., Astoria**—BERTHING FACILITIES—Yards & Docks Annex, Navy Dpt., Arlington, Va., June 14, electrical and mechanical services for inactive fleet berthing facilities at Tongue Point Naval Air Station, from J. Helstrom, Astoria. **$1,575,000.** CD 6/20, under LB.

†**Pa., Phila.**—BARRICADED TRACK—Yards & Docks Annex, Navy Dpt., Arlington, Va., June 13, barricaded track and car checking platform, from L. F. Driscoll, 18 W. Chelten Ave., **$162,000.** Est. $168,700. CD 6/4—ENR 6/6.

Tex., Austin—ELECTRIC LIGHTING SYSTEM — Bd. Regents University of Texas, rejected bids June 6, electric lighting memorial stadium, internal sports arena, etc. L. B. **$123,500.** Will readvertise. CD 6/14.

Tex., Dallas—HANGAR—City, E. Goforth, secy., hangar at Love Feld, from A. J. Rife, 2808 Inwood Rd. **$145,749.** Pettigrew, Cook & Asso., 2001 Denton Dr., archts. CD 12/13 45—ENR 12/27/45.

Tex., Fort Worth—STADIUM SITE IMPROVEMENTS—Texas Christian University Stadium Assoc., Fort Worth, June 13, site imprvs. at T. C. U. stadium, incl. excav., storm sewers, manholes, paving, concrete paving, asphalt surface treatment, curbs, gutters, sidewalks, watermains, etc. from Texas Bitulithic Co., 111 Commerce St., Dallas. **$189,997.** CD 6/4—ENR 6/6.

Tex., Nacogdoches — STEAM TUNNEL — Stephen F. Austin, State Teachers College, steam and utility tunnel; 3 lines to run thru tunnel from central heating plant, from E. S. Farrow Co., 6109 Forest Park Rd., Dallas. **$44,000.** S. Simons, 118 W. 4 St., Tyler, archt. CD 5/20.

†**Va., Portsmouth**—WHARF RECONSTRUCTION—Yards & Docks Annex, Navy Dpt., Arlington, June 6, reconstructing wharf, Berth 6, at Norfolk Naval Shipyard, NOY 12883, from Tidewater Constr. Corp., 538 Front St., Norfolk, **$156,072.** CD 5/22—ENR 5/30.

†**Tex., Texarkana**—TANKS—U. S. Eng., P. O. Box 61, Tulsa, Okla., June 10, erecting tanks for ordnance storage, Red River Arsenal, from Secor Building Co. and Booth Tank Co., Inc., 2613 N. Oklahoma St., Oklahoma City, Okla., **$236,190.** Est. $225,000. CD 6/5.

†**Wash., Fort Lewis**—FUEL STORAGE TANKS—U. S. Eng., 1400 Textile Tower Bldg., Seattle 1, June 14, 33 fuel storage tanks at Mt. Ranier Ordnance Depot, Spec. 46-123, from S. Bergesen, Rt. 10, Box 971, Tacoma. **$68,434.**

†**Wash., Longview**—CONTROL HOUSE, etc.—Bonneville Power Admin., P. O. Box 3537, Portland, Ore., received no bids June 5, control house and oil house, Inv. 3665. CD 5/1—ENR 5/9.

Wash., Marblemount—FISHERIES, etc.—State Dpt. Fisheries, Smith Tower, 2 Ave. and Yesler Way, Seattle, Zone 4, June 11, fisheries station on Skagit River, with rein.-con. ponds, 2 houses, hatchery, etc., from Gaasland Constr. Co., Bellingham, **$237,902.** Est. $130,000. CD 5/22—ENR 5/30.

CONTRACTS AWARDED

Calif., Antioch—AIRPORT, etc.—G. J. Viera & J. F. Viera, Jr., Antioch, concrete block airport, steel hangars, hotel, swimming pool, bowling alley, tennis courts, amusement center, own forces. **$230,000.**

†**Calif., Corona**—SPRINKLER SYS.—Yards & Docks Annex, Navy Dpt., Arlington, Va., sprinkler sys. in 45 ward bldgs., 7 brick fire walls at Naval Hospital, NOY 13650, to C. W. Driver, Inc., 111 W 7 St., Los Angeles. **$103,859.** Bids 6/4.

†**Calif., Moffett Field** — TUNNEL EQUIPMENT—National Advisory Com. for Aeronautics, Ames Aeronautical Laboratory, auxiliary equip. for supersonic wind tunnel, to Western Piping & Engrg. Co., 119 Kansas St., San Francisco. $161,573.

Calif., San Francisco—PLAYGROUND FACILITIES—City, Recreation Comn., City Hall, repairing surface and misc. facilities of 8 city playgrounds, to Fay Imprvt. Co., 760 Market St. **$30,562.**

Conn., Danbury—RADIO STATION—Berkshire Broadcasting Corp., John Derne, Danbury, F/M radio station, control bldg., towers, and broadcasting studio, to William Pisaretz, 138 Housatonic Ave., Stratford. Est. **$55,000.** Ernes Larson, 72 Brooklawn Pkway., Fairfield, archt. CD 3/12—ENR 4/4.

Conn., Windsor Locks—AIRFIELD BLDGS., etc.—U. S. Eng., Park Square Bldg., Boston, Mass., altering bldgs., exten. sewer, Bids 6/7, and water sys., also firing range, Bradley Field, to M. Slotnik, Inc., 333 Washington St., Boston, Mass., **$64,435.**

Fla., Miami—SWIMMING POOL—Robert Clay Hotel, 120 SE 4 St., 35x75 ft., cement, tile swimming pool, sea wall, 4 locker rooms, to Witters Constr. Co., 1714 SW 6 St., **$132,000.** L. M. Dixon, 605 Lincoln Rd., archt. R. A. Belsham, 2145 SW 11 St., engr.

Fla., Tallahassee — STREET LIGHTING SYS.—City, White Way street lighting sys., underground wiring in downtown area, various sections, to Harrison-Wright Co., 116 W. 3 St., Charlotte, N. C. **$777,860.** Robert & Co., Bona Allen Bldg., Atlanta, Ga., engrs.

★**N. Y., Idlewild** — REPLACING HYDRAULIC FILL—Dpt. Marine & Aviation, Pier A, foot of Battery, Pl., North River, Zone 4, hydraulic fill at Municipal Airport, Contr. 21, to Atlantic Gulf & Pacific Co., 13 Park Row, New York, Zone 7. **$2,554,700.** CD 5/15—ENR 5/23, under LB.

LAST MINUTE CONSTRUCTION REPORTS

WATER SUPPLY

Additional earlier Construction Reports will be found in the regular section.

BIDS ASKED

Bids Asked July 2

Mass., Braintree—Bd. Selectmen, Town Hall, 6- to 12-in. waterlines, Washington, Tremont, Hancock, Division, Shaw, Allen, Commercial, Common Sts., Brewster, Arbutus and Quincy Aves., South Braintree, Highlands and Braintree. Over $22,500.

Bids Asked July 4

Sask., Lloydminster—Town, W. M. Cardiff, clk., watermains. $40,000. Plans deposit $20. Underwood & McLellan, 502 Grain Bldg., Saskatoon, engrs. CD 7/20/45—ENR 8/2/45.

Bids Asked July 10

Mich., Sturgis—C. P. Habel, city clk., City Hall, substructure for 32x85 ft., rein.-con. WW power house addn. Plans deposit $20. Ayres, Lewis, Norris & May, Ann Arbor, engrs.

Bids Asked August 1

Ga., Powder Springs—City, c/o mayor, WW sys. Plans deposit $10. Merritt & Welker, Blair Bldg., Marietta, engrs.

LOW BIDDERS

Calif., Los Angeles—Los Angeles Co., Hall of Records, June 18, 19,515 lin. ft. 6 in. steel watermain, valves, fire hydrants, etc., Topanga Canyon Dist., Spec. 793, from Marko Matick, 1269 Eagle Vista Drive, Los Angeles. $57,000. CD 6/4—ENR 6/6.

SEWERS, WASTE DISPOSAL

Additional earlier Construction Reports will be found in the regular section.

BIDS ASKED

Bids Asked July 2

Mass., New Bedford—City, P. Wks. Dpt., sewerage, interceptor sewerage sys. Over $40,000. CD 3-21—ENR 4/4.

Mich., Detroit—City, Dpt. P. Wks., City Hall, interceptor overflow relief connections, high level concrete wier overflow chambers and bulkheading portholes at 3 sites. G. R. Thompson, City Hall, city engr. CD 8/8/44—ENR 8/24/44.

Bids Asked July 4

Sask., Lloydminster—Town, W. M. Cardiff, clk., sewers, $50,000. Plans deposit $20. Underwood & McLellan, 502 Grain Bldg., Saskatoon, engr. CD 7/20/45—ENR 8/2/45.

Bids Asked July 9

Washington—State Hy. Dpt., Olympia, ballasting, surfacing, constructing bituminous surface treatment plant mix type, light bituminous surface treatment and non-skid single seal treating 8.5 mi. Primary State Hy. 15, Chelan Co.; clearing, grubbing, grading, draining, concrete paving, light bituminous surface treating 4.458 mi. Primary State Hy. 5; plant mix bituminous surface treating 2.61 mi. Primary State Hy. 15, both King Co.; asphaltic concrete paving 2.477 mi. Primary State Hy. 21, Kitsap Co.; beam guard rail on Primary State Hy. 5, Elkridge Lodge to Chinook Pass, Kittitas and Yakima Counties.

Bids Asked July 10

Mich., Midland—J. M. Berry, city mgr., City Hall, concrete and vitr. storm sewer $91,000. CD 11/30/44—ENR 12/14/44.

Bids Asked July 15

Calif., Newport Beach—City, City Hall, 17,350 lin. ft. 8 and 10 in. vitr. clay sanitary sewer in Ocean Blvd. and other Streets, Corona del May Sys. $105,470. Plan deposit $15. J. W. Webb, City Hall, engr. CD 3/12—ENR 4/4.

SOON LETS CONTRACT

N. Y., New York—Woodlawn Cemetery Assoc., 233 St. and Woodlawn Ave., soon lets contract 1½ ton incinerator. $40,000.

LOW BIDDERS

†Calif., Stockton—U. S. Eng., 1209 Eighth St., Sacramento, June 21, sewerage sys., revision, addns. at Lathrop ASF Depot, Spec. 1236, from F. J. Early Jr., Co., 369 Pine St., San Francisco. $67,000.

★**Ill., Chicago**—Sanitary Dist. of Chicago, 910 S. Michigan Ave., June 20, altering No. 2 Steam generating unit and 3 sludge drying units at Southwest Sewage Treatment Works, Div. AM, from Independent Boiler & Tank Co., 1249 N. Clark St. $1,167,075. CD 6/12.

BRIDGES

Additional earlier Construction Reports will be found in the regular section.

BIDS ASKED

Bids Asked July 12

Kentucky—Dpt. Hys., Frankfort, substructure for bridge over Green River, 0.28 mi. Morgantown-Hartford Rd., F 125 (13) SP 16-36, Butler Co.; superstructure for four 69 ft. plate girder and one 316 continuous plate girder bridge over Licking River, Falmouth-Alexandria Rd., near Butler, F 367 (6)-2, SP 96-237, Pendleton Co.; four 40 ft. rein.-con. span, one 240 ft. continuous I-beam bridge 0.078 mi. Falmouth-Alexandria Rd., FG-367 (9) SP 96-237, Pendleton Co.

Bids Asked July 17

Ontario—Province of Ontario, J. D. Miller, Dpt., Hys., Toronto, bridge on Hy. 7, Strathroy, $40,000; bridge, Exeter West, $45,000. Dpt. Hys., Toronto, engr.

LOW BIDDERS

Idaho—State Dpt. Hys., Boise, received no bids June 14, 825 ft. concrete, steel bridge across Snake River on Burley-Paul Rd., Cassia Co. $214,000. CD 1/21—ENR 2/7.

★**Pennsylvania**—State Hy. Dpt., Harrisburg, June 21, rein.-con., concrete deck I-beam bridge, bituminous surfacing for paving railroad crossing, 2 rein.-con. structures, between Collegeville Boro and Zeiglerville, Montgomery Co., from James McGraw Co., Commercial Trust Bldg., Phila. $890,786. CD 6/11—ENR 6/13.

CONTRACTS AWARDED

★**California**—State Div. Hys., Sacramento, overhead crossing over tracks of Southern Pacific and Western Pacific R.R. at 5 Ave. and East Shore Freeway, Oakland, Alameda Co., to Stolte Inc., 8451 San Leandro St., Oakland, and Duncanson-Harrelson Co., 1404 De Young Bldg., San Francisco. $1,692,897. Bids 6/21. CD 6/18—ENR 6/20, under LB.

★**Connecticut**—State Hy. Comn., Hartford, grading, concrete paving approach to Charter Oak Bridge 170 ft. span over Hockanum River, Manchester-East Hartford, to A. I. Savin Constr. Co., 10 Village St., East Hartford, Conn. $928,117. Bids 5/27. CD 6/13—ENR—6/20.

STREETS AND ROADS

Additional earlier Construction Reports will be found in the regular section.

BIDS ASKED

Bids Asked July 2

Indiana—State Hy. Dpt., J. H. Lauer, chn., Indianapolis, widening, bituminous resurfacing 9.49 mi. Rds. 3 and 67, Greenfield Hy. Dist., Delaware Co.; 5.76 mi. Rd. 67, Greenfield Hy. Dist., 5.69 mi. Rd. 167, Greenfield Hy. Dist., both Delaware and Jay Counties. C. E. Vogelsang, ch. engr.

Bids Asked July 12

Kentucky—Dpt. Hys., Frankfort, reconstruction and bituminous surfacing 5.821 mi. Vanceburg-Kinniconnick Rd., S 106 (1), SP 68-74, Lewis Co.; flood damage repair 2.932 mi. Narrows Rd. and Toller-Hardy Rd. and Hardy Rd., SP 98 Proj. WER 1 (2), SP 98-103, 98-643, Pike Co.; 5.868 mi. Lick Creek Rd. and Ferrel Creek Rd., Proj. WER 1 (3), SP 98-583, 98-603, Pike Co.; grading, draining, traffic bound surfacing 3.835 mi. Whitley City-Monticello Rd., S 428 (5), SP 74-93, 116-39, McCreary and Wayne Counties; bituminous surfacing 9.34 mi. Beulah-Providence Rd., S 354 (5), S 413 (4) and SP 54-260, 117-229, Hopkins and Webster Counties; 5.8 mi. Davis-Josephine Rd., RH 1006-Sec. A, 3.8 mi. Lemmons Hill Rd., RH 1012, 6.3 mi. Iron Works Rd., RH 1017,-Sec. A., all foregoing RH Group 7, Scott Co.; 1 mi. Ninevah Rd., RH 1001-Sec. A, 1.2 mi. Leestown Rd., RH 1006-Sec. A, 2.2 mi. same road, RH 1006-Sec. B, 0.8 mi. Frankfort-Peaks Mill Rd., RH 1012-Sec. A, 2.2 mi. Evergreen-Benson Rd., RH 1017-Sec. A, 1.5 mi. Dry Ridge-Duval Rd., RH 1030-Sec. A, 0.9 mi. Flat Creek Rd., RH 1034-Sec. A, 3.1 mi. Indian Gap Rd., RH 1041, all foregoing RH Group 8, Franklin Co.; 1.5 mi. Zaring Mill Rd., RH 1001-Sec. A, 2.2 mi. Buck Creek-Simpsonville Rd., RH 1004-Sec. A, 1.25 mi. Scott's Station Pike, RH 1005-Sec. A, 2 mi. Cropper-Christianburg Rd., RH 1035, Sec. A, 4.7 mi. Benson Pike, RH 1043-Sec. A, 1.5 mi. Pea Ridge Rd., RH 1058-Sec. A, all foregoing RH Group 9, Shelby Co.; 6.5 mi. Preston Rd., RH 1006, 6.1 mi. Sharpsburg-East Union Rd., RH 1009, both Bath Co., and 4.4 mi. Grassy Lick Rd., RH 1001, 6.7 mi. Spencer Rd., RH 1002-Sec. A, 5.4 mi. Grassy-Prewitt Rd., RH 1010, 3 mi. Oldham Rd., RH 1020, al foregoing Montgomery Co., and in Group 10; 2 mi. Union City-Doylesville Rd., RH 1002, Sec. A, 2.1 mi. Kirksville Rd., RH 1004 Sec. A, 2 mi. Four Mile-Box Angle Rd., RH 1016-Sec. A, 3 mi. Scaffold Cane Rd., RH 1020-Sec. A, 2.4 mi. Menalus-Crookaville-Panola Rd., RH 1022-Sec. A, 2 mi. College Hill Rd., RH 1025-Sec. A, 2.1 mi. Barnes Mill Rd., RH 1030-Sec. A, 1.9 mi. same road, RH 1030-Sec. B, 0.6 mi. same road, RH 1030-Sec. C, 2 mi. Stony Run Rd., RH 1042-Sec. A, 2 mi. Tates Creek Rd., RH 1047 Sec. A, all foregoing RH Group 11, Madison Co.; 0.45 mi. Pleasant Valley Rd., RH 1123-Sect. A, 0.4 mi Daniels Rd., RH 1124-Sect. A, 1.6 mi. Veach Rd., RH 1172, 0.11 mi. 18 St., RH 1175,, 0.75 mi. Crabtree Ave., RH 1176, all foregoing RH Group 6, Daviess Co.; 3.95 mi. Owensboro-Pellville Rd., SP 30-37, Daviess Co.; 17.218 mi. Harlan-Hyden Rd., SP 48-188 SP 66-32, Harlan and Leslie Counties; bituminous preservative 12.56 mi. Sandy Hook-Morehead Rd., SP 32-89, SP 103-42, Elliott and Rowan Counties; concrete paving 4.045 mi. Mt. Vernon-Stanford Rd., SP 102-117, Group SP 23, Rockcastle Co.; roadside imprv. 7.965 mi. Shelbyville-Frankfort Rd., SP 106-106, Shelby Co.

LOW BIDDERS

California—State Div. Hys., Sacramento, rejected bids June 19, plant mix surfacing 9.2 mi. Mono Co. L.B. $154,778. CD 6/18—ENR 6/20.

★**Idaho, Idaho Falls**—City, City Hall, received no bids June 17, grading, paving, draining, curbs, gutters 10 mi. city streets, $400,000; grading, 20 mi. concrete sidewalks, $245,000. CD 6/4—ENR 6/6.

N. Y., Delhi—Hy. Dpt., Delaware Co., County Hy. Office, Page, received no bids June 19, Dunk Hill-Frear Hollow Co. Rd. $115,143. CD 6/14.

★**Pennsylvania**—Commonwealth of Pennsylvania, Dpt. Hys., Harrisburg, June 21, imprv. 28,809 ft. Berks Co., from J. H. Swanger, Lancaster, $973,876***3.246 mi. Delaware Co., from Acchione Contracting Co., 1607 McKean St., Phila., $315,542***5.077 ft. Allegheny Co., from Ragner Bros., Grant Bldg., Pittsburgh, Zone 19, $162,427***1,200 ft., hy. and rein.-con. bridge, Tioga Co., from Reed & Kuhn, Elysburg, $47,476. Received no bids June 21, imprv. 8,031 ft. hy. and 23,666 ft. hy., both Cambria Co., will readvertise. CD 6/11—ENR 5/20.

★**Virginia**—State Hy. Dpt., Richmond, June 20, imprv. 1.81 mi. Hy. Routes 350 and 236, and 1.47 mi. Route 350, Fairfax Co., from Nello L. Teer, Durham, N. C., $1,133,368 and $921,995 respectively***3.25 mi. Grayson Co., from W. E. Graham & Sons, Cleveland, N. C., $324,467***1.3 mi. Richmond Co., from Perkins-Barnes Constr. Co., Blackstone, $48,406. CD 6/12.

†**Washington**—Pub. Roads Admin., Bedell Bldg., Portland, Ore., June 18 clearing, grubbing, grading, surfacing, Lewis River Hy., Columbia National Forest, Cowlitz Co., from Peter Kiewit Sons Co., 1403 W. 45 St., Seattle. $142,841. CD 6/10.

Wash., Spokane—Spokane Co., Court House, June 17, light bituminous surface treating 69 mi. county roads from Standard Asphalt Paving Co., Chronicle Bldg. $107,530. CD 8/30/44—ENR 9/21/44.

Wash., Yakima—Yakima Co., Courthouse, June 18, imprv. 4.88 mi. Liberty, Gurley, Cherry Hill and Granger Emerald Rds., from Pendleton Sand & Gravel Co., Pendleton, Ore., $55,039***3.61 mi. Factory and Midvale Rds., from W. Berndt, Yakima, $43,701***6.48 mi. E. Zillah Rd., from Bunney Bros. and S. H. Edinger, 2612 35 Ave. W., Seattle, $56,101*** 7.28 mi. Lower Ahtanum Rd., S. 16 Ave., and S. Bway., from C. E. O'Neal, Ellensburg, $67,266, est. $75,000***10.76 mi. Tieton-Naches Rd., Naches Heights Rd. and Young Grade Rd., from G. G. Ensminger, Yakima, $78,739. CD 6/10/46—ENR 9/20/45.

CONTRACTS AWARDED

Idaho—State Dpt. Hys., Boise, surfacing 8 mi. Moscow-Bovill Hy., Latah Co., to Shoshone Co., Twin Falls, $101,986. Est. $104,000. Awarded 6/14. J. Reid, Lewiston, engr.

★**Indiana**—State Hy. Comn., Indianapolis, imprv. 3.001 mi. Rd. 31, Johnson Co., to Rieth-Riley Constr. Co., Goshen, $568,290, est. $568,963; 7.606 mi. Rd. 31, Johnson Co., to W. D. Vogel, 1760 E. St. Clair St., Indianapolis, $850,224, est. $851,268. CD 5/24—ENR 5/30, under LB.

★**Kansas**—State Hy. Dpt., Kansas City, imprv. 10.275 mi. Marshall Co., to S. Simpson, McPherson, $214,602***0.474 mi. Wyandotte Co. and 0.088 mi. Wyandotte Co., to J. A. Tobin Constr. Co., 2700 Rainbow Blvd., Kansas City, Kan., $223,357 and $75,843 respectively. Grand total $513,802. Bids 6/12. CD 5/25—ENR 6/6.

Washington—State Hy. Dpt., Olympia, imprv. 5.631 mi. Whitman Co., to F. F. Barnes, W. 3323 Alice St., Spokane, $36,638 ***manufacturing and stockpile crushed stone surfacing top course, mineral aggregates Primary State Hys. 2, 16, and 15-C, Kittitas and Chelan Counties, to Joslin & McAllister, N. 303 Haven St., Spokane, $52,084. Bids 6/18. Rejected bids June 18, imprv. 5.991 mi. Pacific Co.; no bids received June 18, imprv. 9.67 mi. hy. Pierce Co. CD 6/6.

★**Alberta**—Province of Alberta, Edmonton, hardsurfacing 33 mi., Olds, to Standard Gravel & Surfacing Co., Ltd., 7 Manchester St., Calgary, $500,000; grading 27 mi. Calgary, to Assiniboia Engrg. Co., Ltd., 14 Lesson St., Calgary, $160,000. Dpt. Pub. Wks., Edmonton, engr.

★**British Columbia**—Province of British Columbia, Parliament Bldg., 22.58 mi. roadwork, Princeton-Headley Hy., Princeton, to Campbell Constr. Co., Ltds., Hall Bldg., Vancouver, $599,797. CD 5/24—ENR 5/30, under LB.

EARTHWORK, WATERWAYS

Additional earlier Construction Reports will be found in the regular section.

BIDS ASKED

Bids Asked July 9

†Calif., Oakland—U. S. Eng., 74 New Montgomery St., San Francisco, dredging and berthing areas, Naval Supply Depot, Serial 04-203-46-58. Extended date.

Bids Asked July 23

†Arizona — Bureau Reclamation, Yuma, earthwork, lining, structures, A canal and A laterals, Unit 1, Yuma Mesa Div., south of Yuma, Gila Proj., Spec. 1402.

LOW BIDDERS

Calif., Goleta—Taecolote Ranch, Goleta, June 17, rein.-con. lined reservoir on Tecolote Ranch, from Baker & Pollock, 544 Jordan Ave., Ventura. **$46,076.** Taylor & Taylor, 725 S. Spring St., Los Angeles, engrs.

†Indiana—U. S. Eng., P.O. Box 59, Louisville, Ky., June 18, drainage structures, Station 659 plus 26, Brevoort Levee Imprv., Wabash River, Sect. and betterments for Brevoort Levee, Deshee Sect., Knox Co., Inv. No. W-15-029-46-72 and 72A, from Green Constr. Co., Oaktown. **$205,972.** Est. $173,935. CD 5/23—ENR 5/30.

†Massachusetts—U. S. Eng., Park Sq. Bldg., Boston, Zone 16, June 20, repair storm damage, Fort Warren, George Island, Boston Harbor, Serial No. 19-023-46-94, from G. M. Bryne, 294 Washington St., Boston. **$27,260.**

†Massachusetts—U. S. Eng., Park Sq. Bldg., Boston, Zone 16, maintenance dredging in 27 ft. channel, Weymouth Fore River, Ser. 19-023-46-95, from Bay State Dredging & Constr. Co., 62 Candor St., East Boston. **$67,715.**

†N. Y., Almond—U. S. Eng., Chimes Bldg., Syracuse, 2, June 20, flood protection project Canacadea and McHenry Valley Creeks, Inv. 30-180-46-20, from A. L. Blades & Son, 42 Bway., Hornell. **$124,045.** Est. $129,314. CD 5/17—ENR 5/23.

†Washington—Bureau Reclamation, Yakima, May 27, pump. plants for Pump Areas 1, 2, 3, 4, 5, 13 and 16, from Jose & Klug, 815 S. 5 Ave., Yakima. **$180,272.**

PUBLIC BUILDINGS

Additional earlier Construction Reports will be found in the regular section.

BIDS ASKED

Bids Asked July 2

Okla., Tonkawa—City, E. E. Davis, clk, furnishing, installing, 1,200 hp Diesel engine generator unit complete $80,000. E. A. Jones, Blackwell, engr. CD 4/18—ENR 5/2.

Bids Asked July 12

†Arizona-California-Nevada — Bureau Reclamation, Denver, Colo., metal partitions, doors, railings, structural and architectural metalwork for Boulder Power Plant, Boulder Canyon Proj., Arizona-California-Nevada, Spec. 1362.

Bids Asked July 16

★**Ky., Lexington**—University of Kentucky Bd. Trustees, at office of H. L. Donovan, pres., 4 story, 156 x 200 ft. service building, S. Limestone and S. Upper Sts. W. B. Brock & E. V. Johnson, Lexington, archts. CD 2/4/43—ENR 2/11/43.

Bids Asked August 19

Calif., Huntington Park—City, City Hall, 1 and part 2 story, city hall, 1 and part 2 story, steel reinforced frame, stucco, justice bldg. and jail, Zoe Ave. and Miles Ave. Over $205,000. Plans deposit $25. H. R. Davies, Security Bldg., Long Beach, archt. CD 4/17—ENR 4/25.

LOW BIDDERS

Ga., Atlanta—Bd. Regents University Sys. of Ga., Atlanta, June 20, research bldg. addn., alterations, at Georgia Tech., from Thompson & Street, Pineville Rd., Charlotte, N. C., **$386,000.** CD 6/6—ENR 6/13.

Mass., Haverhill—City, Municipal Offices, rejected bids June 18, frame housing, G. I. Village. C. F. Goodwin, 25 Washington Sq., archt. CD 6/12—ENR 5/23.

★**†N. C., Camp LeJeune (br. New River)**—Yards & Docks, Navy Dpt., Arlington, Va., June 15, 100 addn. officers quarters, Spec. 17940, from T. A. Loving & Co., Bank of Wayne Bldg., Goldsboro, N. C. **$1,822,231.** CD 5/27—ENR 5/30.

★**Wash., Buckley**—State Dpt. Finance, Olympia, June 19, two 1 story, 110 x 130 ft. nursery bldgs., two 1 story, 130 x 230 ft. custodial bldgs., at Western State Custodial School, from A. F. Mowat Const. Co., 2833 Eastlake Ave., Seattle, **$829,750.** Est. $600,000. CD 5/27—ENR 5/30.

CONTRACTS AWARDED

†Calif., Corona—Yards & Docks Annex, Navy Dpt., Arlington, Va., wood frame laundry at U. S. Naval Hospital, Spec. 17252, to W. C. Smith, Inc., 2119 Pacific Blvd., Long Beach. **$87,005.** Bids 6/18. CD 6-12—ENR 6/20.

★**†Conn., New London**—Yards & Docks Annex, Navy Dpt., Arlington, Va., electrolite storage, incl. grading, road work, distr. and services, at Naval Submarine Base, Spec. 17481, to Tuller Constr. Co., 95 Monmouth St., Red Bank, N. J., **$1,267,000.** Bids 6/4. CD 6/6—ENR 6/20. under LB.

★**†Alaska**—U. S. Eng., Textile Tower 7 and Olive Sts., Seattle, 1, Wash., 140 quarters for military families, 200-man bachelor quarters, 400-man messhall, 2,000-man barracks, 64 civilian families, 240-man civilian bachelor quarters, 400-man civilian messhall, 150x500 ft. warehouse, gas, fuel storage, plane park areas, all at Fort Richardson, Anchorage; temporary housing for 1,000 men, hospital addn., bachelor military and civilian quarters, mess halls, etc., 2 warehouses, 200x300 ft. hangar, gas storage, park areas, Ladd Field, Fairbanks, to Birch-Johnson-Lytle, Textile Tower, Seattle. Est. **$24,000,000.** Fay, Spofford & Thorndike, 11 Beacon Ave., Boston, Mass., engrs.

COMMERCIAL BUILDINGS

Additional earlier Construction Reports will be found in the regular section.

LOW BIDDERS

★**N. C., High Point**—Trustees of High Point Memorial Hospital, Inc., Sheraton Hotel, rejected bids June 18, hospital. **$850,000.** Will revise plans. C. C. Hartmann, Greensboro, archt. CD 6/5—ENR 6/13.

CONTRACTS AWARDED

★**Calif., Inglewood**—Hyatt Dehn, atty. at law, c/o G. Riddle, archt., 1075 Alcalde Dr., Glendale, 458 housing units, 59 two-family, 340 six-room, frame, stucco dwellings, Crenshaw Blvd. and Imperial Hy., to Lindgren & Swinnerton, 605 W. Olympic Blvd., Los Angeles. approx. **$5,000,000.**

★**Calif., Los Angeles**—Western Federal Savings & Loan Assn., 600 S. Hill St., 12 story, Class A bldg., Hill St., between 5 and 6 Sts., own forces. Over **$1,000,000.**

Calif., Oakland—Roman Catholic Archbishop of San Francisco, 1100 Franklin St., San Francisco, 2 story, concrete, frame, 12 classrooms, gymnasium, cafeteria, parochial school, to W. F. Lynn, 1040 Folger Ave., Berkeley. **$299,400.** Blanchard & Maher, 369 Pine St., San Francisco, archts.

Calif., Sacramento—Fruitridge Investment Co., 1005 8 St., 124 residences, Fruitridge Manor, own forces. **$400,000.**

★**Ind., Indianapolis**—Speedway Constr. Co., c/o T. J. Blackwell, Jr., Speedway City, 180 homes, adjacent to motor speedway, own forces. **$1,000,000.**

★**Mo., St. Louis**—G. S. Homes, Inc., c/o Glick Real Estate Co., Inc., 801 Chestnut St., Zone 1, 150 brick, concrete residences, 8,700 block North Broadway and Riverview Blvd., opening Harlan, Elias, Ida and Jordan Aves., George St. and Gene Court through sub-division, own forces. **$500,000.**

N. C., Salisbury—Catawba College, A. R. Keppel, pres., Salisbury, dormitory, etc., to E. W. Wagoner & Sons, Salisbury, to exceed **$300,000.** Bids 6/15. CD 6/5—ENR 6/13.

INDUSTRIAL BUILDINGS

Additional earlier Construction Reports will be found in the regular section.

BIDS ASKED

Bids Asked July 9

Ga., Atlanta — SALES-SERVICE — Moore-Briscoe Co., c/o archt, 1 story, 59x175 ft., concrete, stucco walls, marble auto sales and service bldg. W. J. J. Chase, 140 Peachtree St., archt.

Bids Asked

Mass., Millbury—SALES and SERVICE—W. Roberts, Grove St., 1 story, bsmnt., brick, concrete, sales and service automobile showroom and garage, Waters St. $55,000. Harry L. Meacham Associates, Main St., archts.

Mass., Worcester—PLANT—Neponset Fur Storage Co., Worcester, at office J. S. Bilzerian, archt., 9 Walnut St., (selected list bidders), 1 story, bsmnt., 55 x 150 ft., brick, steel, concrete plant. $100,000. CD 6/10. ENR 6/27.

SOON LETS CONTRACT

Wash., Seattle—LAUNDRY—Empire Laundry & Dry Cleaning Co., Western Ave. and Bell St., Zone 1, soon lets contract 1 story, 120 x 193 ft., rein.-con. laundry. $460,000. H. Bittman, Securities Bldg., Zone 1, archt. CD 5/17—ENR 5/23.

CONTRACTS AWARDED

★**Calif., Burbank**—AIRPLANE MAINTENANCE—Pacific Airmotive Corp., 6265 San Fernando Rd., Glendale, 1 story, steel, rein.-con. airplane maintenance bldg., Winona Way and Hollywood Way, to Buttress & McClellan, 1013 E. 8 St., Los Angeles. **$750,000.** J. MacDonald, 1013 E. 8th St., Los Angeles, archt.

Calif., Castroville — CANNERY — California Artichoke & Vegetable Growers' Corp., Castroville, 1 story, 50x200 ft. metal artichoke cannery, to E. M. Carlsen, 17 Monterey Rd., Salinas. Est. **$55,000.** C. E. Butner, 1 Winham St., Salinas, archt.

Fla., Jacksonville—GARAGE, etc.— J. H. Walsh Co., 304 Pearl St., garage, warehouse, office and salesroom, to O. P. Woodcock Co., Florida Theatre Bldg., **$100,000.**

Ga., Macon—PLANT—Beneeda Bedspread Mfg. Co., Putnam, Conn., bedspread mfg. plant, to D. W. McCowen Constr. Co., Macon. Est. **$60,000.** Dennis & Dennis, Box 78, archts.

Mass., Cambridge—PLANT—J. Reardon, 51 Waverly St., altering, rendering and soap plant, blacksmith shop, drum storage units, rebuilding Steamout Bldg., Waverly St., to Max P. Standke, Inc., 12 Norfolk St., **$110,385.** CD 6/6—ENR 6/27.

Mass., Worcester — FACTORY — Worcester Dusting Mill, 105 Shrewsbury St., 1 story, 170 x 185 ft., brick factory, Prescott St. Owner builds. Over **$55,000.** Harry L. Meacham Associates, Main St., Millbury, archts. CD 4/5.

N. C., Asheboro—MILL—Bossong Hosiery Mills, Inc., C. G. Bossong, pres., 137 x 180 ft. hosiery mill addn., to W. B. Lambe & Sons, Asheboro, **$150,000.** Bids 4/8. E. M. Fenichel, 724 5 Ave., New York, 19, N. Y., archt.

Wash., Seattle — FACTORY — Schorn Paint Mfg. Co., 1128 W. Spokane St., 2 story, 120 x 140 ft., rein.-con. paint factory addn., to Kuney Johnson Co., 235 9 Ave. N. Est. **$150,000.** Bids 6/4. CD 5/27—ENR 5/30.

UNCLASSIFIED

Additional earlier Construction Reports will be found in the regular section.

BIDS ASKED

†Conn., New London—DOCK—Yards & Docks Annex, Navy Dpt., Arlington, Va., repairing dock, Fort Wright, 30-031-46 20.

LOW BIDDERS

†Calif., San Francisco—SPRINKLER SYS.—Yards & Docks Annex, Navy Dpt., Arlington, Va., June 20, sprinkler sys. and water supply piping, NOY 13867, Spec. 17979, from M & K Corp., 200 Financial Center Bldg. **$372,000.** CD 6/12

†N. C., Cherry Point (br. New Bern)—MESS HALL, etc.—Yards & Docks Annex, Navy Dpt., Arlington, Va., received no bids June 14, dispensary addn., galley and mess hall. Specs. 16002 A, Marine Corps Air Station. Will readvertise.

CONTRACTS AWARDED

Conn., Cromwell — GREENHOUSE — A. N. Pierson, Inc., Cromwell, 6 units, 80x600 ft., greenhouse group, to Lord & Burnham, Irvington, N. J. Est. **$215,000.**

★**†Ia., Des Moines**—AIRPORT IMPROVEMENTS—Civil Aeronautics Admin., 414 E. 12 St., Kansas City, Mo., airport imprvs., to Koss Const. Co., Old Colony Bldg. **$669,232.** Bids 6/5. CD 1/26/44—ENR 2/10/44.

†N. C. Cherry Point (br. New Bern)—HANGAR ALTERATIONS—Yards & Docks Annex, Navy Dpt., Arlington, Va., altering final finish hangar, Spec. 17993, Marine Corps Air Station, to Mecklenburg Constr. Co., Durham. **$42,750.** Bids 6/14.

†Wyoming—TRANSMISSION LINE—Bureau Reclamation, Custom House, Denver, Colo., mfg., del. over 1,000,000 lin. ft. stranded wire conductor and other equip. for 63-mile transmission line from Seminoe Dam to Casper, to Aluminum Co. of Amer., 1812 Gulf Bldg., Pittsburgh, 19, Pa. **$117,366.**

Proposal Advertisement see pp. 183, 185

Proposed Projects see p. 130

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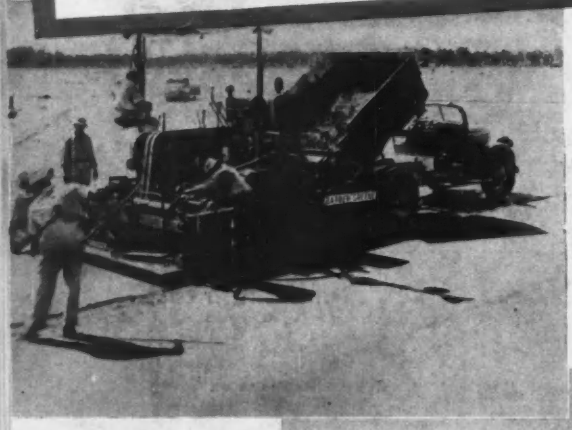
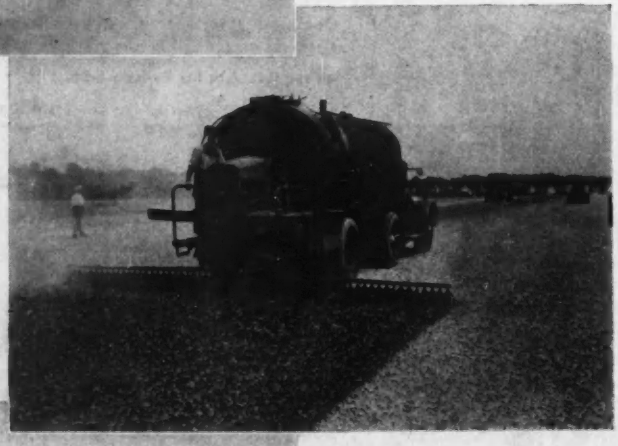


Runways of this Florida airport were paved with Texaco Asphaltic Concrete of the hot-mix, hot-laid type.



Texaco Asphalt Macadam (penetration type) was used in paving runways of this Connecticut airport.

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